BSC

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DISCLAIMER

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CONTENTS

		rage
ΑC	CRONYMS AND ABBREVIATIONS	7
1.	PURPOSE	8
2.	REFERENCES 2.1 PROCEDURES/DIRECTIVES 2.2 DESIGN INPUTS 2.3 DESIGN CONSTRAINTS 2.4 DESIGN OUTPUTS	9 9 12
3.	ASSUMPTIONS	13
4.	METHODOLOGY 4.1 QUALITY ASSURANCE 4.2 USE OF SOFTWARE 4.3 METHODOLOGY	22
5.	LIST OF ATTACHMENTS	24
6.	BODY OF CALCULATION	25 34
7.	RESULTS AND CONCLUSIONS	43
Αŀ	PPENDIX A: ROOM LOAD INFORMATION SHEETS AND U-VALUES	45
Αŀ	PPENDIX B: ASHRAE TABLE VALUES FOR CLTD AND CORRECTION TABLES FOR LATITUDE AND MONTH	103
ΑF	PPENDIX C: COOLING/HEATING LOAD EQUATIONS	107
ΑF	PPENDIX D: PSYCHROMETRIC CALCULATION EQUATIONS	111
ΑF	PPENDIX E: ROOM EQUIPMENT HEAT GAIN LIST	117
ΑF	PPENDIX F: CALCULATED ROOF AND WALL COOLING LOADS	129
Αŀ	PPENDIX G: CALCULATION OF THERMODYNAMIC PROPERTIES OF MOIST	135

APPENDIX H: INFILTRATION AIR COOLING LOAD CALCULATION (ROOM- BY-ROOM)	136
ATTACHMENT 1: EMAIL REGARDING WASTE PACKAGES AND CANISTERS HEAT GAIN INFORMATION	138
ATTACHMENT 2: E-MAIL REGARDING RF ELECTRICAL EQUIPMENT HEAT GAIN INFORMATION	140
ATTACHMENT 3: E-MAIL REGARDING ENVIRONMENTAL, SAFETY & HEALTH EQUIPMENT HEAT GAIN INFORMATION	145
ATTACHMENT 4: E-MAIL REGARDING INSTRUMENTATION AND CONTROLS EQUIPMENT HEAT GAIN INFORMATION	157
ATTACHMENT 5: HVAC AND MECHANICAL PROCESS EQUIPMENT LIST	161
ATTACHMENT 6: E-MAIL REGARDING MECHANICAL HANDLING GROUP EQUIPMENT HEAT GAIN INFORMATION	166
ATTACHMENT 7: E-MAIL REGARDING THE NUMBER OF OCCUPANTS IN THE RF BUILDING.	169
ATTACHMENT 8: SECOND E-MAIL REGARDING MECHANICAL HANDLING GROUP EQUIPMENT HEAT GAIN INFORMATION	172
ATTACHMENT 9: E-MAIL REGARDING MECHANICAL HANDLING EQUIPMENT HEAT GAIN DIVERSITY FACTOR	175

TABLES

		Page
Table 1.	Occupancy Numbers	17
Table 2.	Indoor Design Temperatures	26
Table 3.	Cooling Load Summary	28
Table 4.	Heating Load Summary	32
Table 5.	Space Airflow Rates	35
Table 6.	Subsystem Airflow Rates	39
Table 7.	Subsystem Total Cooling Loads	
Table 8.	Subsystem Total Heating Loads	42
Table 9.	Summary of Subsystem Airflow Rates, Cooling Loads, and Heating L	oads43
Table 10.	Summary Exhaust Airflow Rate	44
Table A-1.	Roof Type 12: 1'-6" Thick Concrete, with R-30 Insulation	99
Table A-2.	Roof Type 1: Metal Roofing	99
Table A-3.	Wall No. 1: 4'-0" Thick Concrete, no insulation	100
Table A-4.	Wall No. 2: Metal Wall	100
Table A-5.	Wall No. 3: 2'-0" Thick Concrete, no insulation	100
Table A-6.	Partition No. 1: 4'- 0" Thick Concrete, no insulation	101
Table A-7.	Partition No. 2: Gypsum Board, One-Hour Fire Rated	101
Table A-8.	Partition No. 3: 2'- 0" Thick Concrete, no insulation	101
Table A-9.	Concrete Floor (2nd Floor): 1'- 6" Thick	102
Table A-10.	Concrete Floor (2nd Floor): 1'- 6" Thick	102
Table A-11.	Door: Metal Roll-up.	102
Table B-1.	Unadjusted CLTD Values and CLF Values (°F)	105
Table B-2.	CLTD Correction For Latitude and Month Applied to Walls and Roof	s (°F) .106
Table B-3.	Monthly Outdoor Design Temperatures	106
Table C-1.	Cooling Load Equations	107
Table C-2.	Heating Load Equations	109
Table C-3.	Infiltration and Ventilation Cooling and Heating Load Equations	110
Table E-1.	Equipment Heat Gain List	118

Table F-1.	Room-by-Room Calculated Roof Cooling Loads	130
Table F-2.	Room-by-Room Calculated Wall Cooling Loads	132
Table G-1.	Thermodynamic Properties of Moist Air	135
Table H-1.	Infiltration Air Cooling Load	136

ACRONYMS AND ABBREVIATIONS

ACH air changes per hour AHU air handling unit

ANSI American National Standards Institute

ASHRAE American Society for Heating, Refrigeration and Air Conditioning Engineers

BSC Bechtel SAIC Company, LLC Btu/h British thermal unit per hour

CLF cooling load factor

CLTD cooling load temperature difference (or differential)

DIRS Document Input Reference System

DOE U.S. Department of Energy

HVAC heating, ventilating, and air conditioning

ITS important to safety

RF Receipt Facility

WP Waste Package

1. PURPOSE

The purpose of this calculation is to determine the following quantities for heating, ventilating, and air conditioning (HVAC) subsystems serving the non-ITS tertiary confinement areas of the Receipt Facility (RF):

- Room-by-room cooling and heating loads
- Room airflow rates
- Subsystem airflow rates
- Required outdoor air rates
- Total cooling load per subsystem
- Total heating load per subsystem

The heating and cooling load for the non-confinement (non-ITS) areas of the RF is determined in a separate calculation, 200-M8C-VNI0-00100-000-00B (Reference 2.2.24). The ITS Electrical and Battery Rooms (tertiary confinement areas) cooling and heating load is determined in calculation 200-M8C-VCT0-00700-000-00B (Reference 2.2.27). The ITS confinement breach areas exhaust requirement is determined in calculation 200-M8C-VCT0-00100-000-00A (Reference 2.2.21).

Revision C of this calculation relates the HVAC Subsystems (i.e. AHU-D, EXH-D) to HVAC equipment numbers consistent with References 2.2.29 through Reference 2.2.36. All HVAC equipment numbers are prefixed by "200-VCT0" unless otherwise noted.

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2.3 DESIGN CONSTRAINTS

None

2.4 DESIGN OUTPUTS

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3. ASSUMPTIONS

3.1 ASSUMPTIONS REQUIRING VERIFICATION

3.1.1 General Arrangement Drawings

It is assumed that the room name designations, dimensions, and constructions are as shown in the Receipt Facility General Arrangement Drawings (References 2.2.13 through 2.2.20).

Rationale—The RF General Arrangement Drawings are presently in the preliminary design stage; hence, they are a preliminary source of information for determining the thermal heat loads of the individual rooms in the HVAC system. When the plant design drawings and architectural drawings are issued for construction, the room designations, room dimensions, wall and roof construction, and material information will be verified.

3.1.2 Lighting

The lighting type in rooms with a ceiling height of 14 ft or lower and all first, second and third floor corridors is assumed to be fluorescent, with two lamps per fixture, a lighting density of 2 W/sq. ft, and a ballast factor of 1.2. The lighting for all of the remaining spaces is assumed to be High Bay, Incandescent-type, with a lighting density of 2 W/sq. ft.

Rationale—The lighting fixture types have not been specified at this stage in the design. A lighting density of 2 W/sq. ft is a conservative estimate, based on the range of lighting densities allowed by the ANSI/ASHRAE/IESNA Standard 90.1-2004, 2004 Energy Standard for Buildings Except Low-Rise Residential Buildings (Reference 2.2.6, Tables 9.5.1 and 9.6.1). The assumption of two fluorescent lamps per fixture, according to the Cooling and Heating Load Calculation Manual (Reference 2.2.3, Table 4.1, p. 4.1), indicates an average ballast factor of 1.2 for use in the lighting portion of the load calculation, for rooms with a ceiling height of 14 ft or lower and all first, second and third floor corridors. The types of fixtures and lighting density will be verified with actual design lighting densities, as the design progresses to completion.

3.1.3 Factor of Safety

It is assumed that the 20% factor of safety, added to each room's cooling load, is adequate to include heat gains in the supply ductwork and to include any uncertainties in equipment heat gain.

Rationale—Various heat gain quantities are not firmed-up at this time. Adding a factor of safety for any unverified cooling loads is common engineering practice. The factor of safety will be checked and adjusted as the design progresses to completion.

3.1.4 Equipment Heat Gain List

It is assumed that the equipment heat gain estimates used in Appendix E represent the best available information at this stage of the design.

Rationale—The design of the RF is still in a preliminary stage, and accurate configurations and sizes of heat producing equipment are not known. However, a combination of preliminary inputs from interdepartmental disciplines yields conservative estimates for the RF room heat loads. As the design progresses, Appendix E will be updated.

3.1.5 Air Temperature Leaving the Cooling Coil

It is assumed that the air temperature leaving the cooling coil is 51°F dry bulb and 46.36°F wet bulb.

Rationale—The actual air temperature leaving the cooling coil can only be determined upon selection of a cooling coil. In this calculation a leaving dry bulb temperature of 51°F is assumed, because a normal cooling coil design has a 9°F approach. A typical entering chilled water temperature is 42°F, the 51°F dry bulb leaving air temperature then meets the approach criteria. Per Assumption 3.1.11, the humidity ratio of the indoor air is assumed to be approximately 0.00645 lb moisture/lb of dry air. With this humidity ratio the cooling coil process is expected to be a sensible only process. Consequently, the leaving air humidity ratio will equal 0.00645 lb moisture/lb of dry air and this equates to a wet bulb temperature of 46.36°F.

3.1.6 Supply Fan Heat Gain

It is assumed that the maximum temperature rise of the supply air as it passes through the supply fan and motor is 6°F for all subsystems.

Rationale—From 2004 ASHRAE HVAC Systems and Equipment (Reference 2.2.7, Chapter 18, p. 18.6) for low pressure rises, the following equation is used to calculate the temperature rise across a fan:

$$\Delta T = \frac{\Delta P \cdot C_p}{\rho \cdot c_p \cdot J \cdot \eta}$$
 (Eq. 1)

where

 ΔT = temperature rise across fan, °F

 ΔP = pressure rise across fan, in. w.g.

 C_p = conversion factor = 5.193 lbf/ft² in. w.g.

 ρ = density of air, lbm/ft³

 c_p = specific heat = 0.24 Btu/lbm °F

J = mechanical equivalent of heat = 778.2 ft lbf/Btu

 η = efficiency (combined efficiencies of motor and fan).

A pressure rise across the fan of 9.5 in. w.g. is a reasonable total pressure drop for the RF HVAC systems, especially the units containing HEPA filters. The density of the air at the temperature entering the supply fans, $102^{\circ}F$ (highest expected air temperature), is approximately 0.062 lbm/ft³. A conservative efficiency for a centrifugal fan is 0.84. A reasonable motor efficiency for motors in the range of 75 hp to 125 hp is 0.90 (Reference 2.2.4, Table 3A p. 30.7). These values give a temperature rise of $5.64^{\circ}F$. Rounding up to $\Delta T = 6^{\circ}F$ gives a conservative estimate for the

temperature rise across the supply fan and motor. This result derives from a subsystem with the worst pressure rise across fan. For other subsystems with lower pressure rise across fan, it will be re-evaluated in the detailed design.

3.1.7 Room Ventilation Confinement Zoning

It is assumed that the ventilation confinement zoning classifications, for the layouts given in the *RF Ventilation Confinement Zoning Analysis* (Reference 2.2.12), are suitable for use and are the best available information at this stage of the design.

Rationale—The RF Ventilation Confinement Zoning Analysis (Reference 2.2.12) is a committed calculation and determines the ventilation confinement zoning for the rooms in the RF. When that calculation is confirmed, the ventilation confinement zoning will be verified.

3.1.8 Room Infiltration Rates

It is assumed that the infiltration rates presented in the *RF Building Confinement Areas Air Leakage Calculation* (Reference 2.2.21) are suitable for use and represents the best available information at this stage of the design. Note that Rooms 1006 and 1007A have been changed to Rooms 1212 through 1224 and 1205 as shown on Receipt Facility General Arrangement Drawings (Reference 2.2.13 and 2.2.14).

Rationale—This cooling and heating load calculation uses a building layout that has been updated from the layout assumed in the RF Building Confinement Areas Air Leakage Calculation (Reference 2.2.21). Consequently, some rooms have minor changes, but these changes have a negligible impact. If the infiltration airflow rates calculated in the next revision of the RF Building Confinement Areas Air Leakage Calculation change then the infiltration rates will be verified and updated accordingly. There are non confinement room infiltrations that are accounted for in RF Heating and Cooling Load Calculation (Non Confinement) (Reference 2.2.2.24); however no credit is taken for these rooms that are adjacent to the Tertiary Confinement Non-ITS areas. These rooms are considered non-existent and the Tertiary Confinement Non ITS walls are assumed to face the outside wind conditions which results in higher delta pressure and hence higher infiltration.

3.1.9 U-Values for Metal Building

It is assumed that the U-Values for the metal building roofs and walls are as follows:

$$U_{ROOF} = 0.065$$
 Btu/h-ft²-°F and $U_{WALL} = 0.113$ Btu/h-ft²-°F

Rationale—The design of the building envelope associated with this calculation is in the preliminary stage. These values are the best available information at this time, which are consistent with Table 5.5-5 and Figure B-1 of ASHRAE Standard 90.1-2004, 2004 Energy Standard for Buildings Except Low-Rise Residential Buildings (Reference 2.2.6). As the design progresses to the detailed design phase, the U-values will be verified and updated appropriately.

3.1.10 Cascade Airflow

It is assumed that the cascade airflow "in" and "out" quantities presented in Table 5, Space Airflow Rates, are suitable for use.

Rationale—The determination of cascade airflows is an integral part of the design process and is determined based on room layout and room air balance. The cascaded quantities are ideally developed during the conceptual stage of the Ventilation Flow Diagrams but these diagrams are not currently available. The values presented in Table 5 will be updated in future revisions using issued ventilation flow diagrams, as applicable.

3.1.11 Humidity Ratio of Indoor Air

It is assumed that the humidity ratio of all air inside the facility for summer design will equal the humidity ratio of the design outdoor air condition 102°F dry bulb/65°F wet bulb which equals approximately 0.00645 lb moisture/lb of dry air.

Rationale—This is a reasonable assumption because the expected latent loads in the RF are very small compared to the amount of sensible loads expected. Due to infiltration and ventilation, air entering the building on a continual basis and an expectation that all cooling coil processes will be sensible cooling only, the indoor air should reach, for design purposes, a steady state humidity level equal to the design outdoor conditions.

3.1.12 Large Interior and Exterior Metal Doors

It is assumed that the large interior and exterior metal doors (roll-up, etc.) have a U-Value of 1.15 Btu/h-ft²-°F and the door dimensions are based on the committed calculation, *RF Building Confinement Areas Air Leakage Calculation* (Reference 2.2.21).

Rationale—The door dimensions are not indicated on the RF Layouts and Sections (References 2.2.13 through 2.2.20), consequently the door dimensions used in the RF Building Confinement Areas Air Leakage Calculation (Reference 2.2.21), are used in this calculation. Also, the large interior and exterior metal doors have not been specified at this time, therefore the U-Value of 1.15 Btu/h ft² °F is taken from the Annunciated Steel Door entry in Table 6 on p. 31.11 of 2005 ASHRAE Fundamentals (Reference 2.2.4). The number is the most conservative in the Table for Sectional Overhead Doors. The U-Value and dimensions of the large interior and exterior metal doors will be verified in detailed design.

3.1.13 Corridor Tunnel Construction

It is assumed that all corridors on the first, second and third level, inside the concrete portion of the structure, are of tunnel construction and have a ceiling height of 14 ft.

Rationale—The RF General Arrangement and Sections (References 2.2.13 through 2.2.20) show some of the corridors with a tunnel construction, but not all corridors are visible in the building sections. The current Plant Design computer model shows tunnel construction for the first and second level corridors. Because the Plant Design computer model cannot be referenced, the

construction of the corridors must be assumed. The height of the top of the tunnel ceiling will be verified when the General Arrangement Drawings are issued.

3.1.14 Temperature of External Stairwells and Fire Water Riser Valve Rooms

It is assumed that the internal temperatures of all externally located stairwells and all Fire Water Riser Valve Rooms are equal to the outdoor ambient temperature and walls adjacent to the exterior stairwells and fire water riser valve rooms can be treated as walls with sunlit facing exteriors.

Rationale—The external stairwells and fire water riser valve rooms are not conditioned spaces at this point in the design of the RF. Their internal temperatures will rise and fall with the outdoor temperature. Consequently, a more conservative load calculation can be achieved if these small areas are assumed to be non-existent. This assumption will be verified during the detailed design phase of the RF.

3.1.15 Occupancy Numbers

It is assumed that the number of people in the occupied areas of the RF Tertiary Non-ITS areas is as indicated in Table 1.

Room No.	Room Name	No. of People
1002	Lid Bolting Room	4
1017	Cask Preparation Room	6
1017A	Cask Preparation Annex	2
1212 to 1224	Support Areas	3
	Total	15

Table 1. Occupancy Numbers

Rationale—The number of people is estimated based on conversations with the Operations group. The preliminary numbers have been confirmed in an e-mail shown in Attachment 7. These occupancy numbers will be verified as the design progresses.

3.1.16 Not Used

3.1.17 Not Used

3.1.18 Equipment Heat Gain in R001, Freight Elevator Machine Room

It is assumed that the equipment heat gain in Room R001, Freight Elevator Machine Room, is equal to 1000 Watts or 3412 Btu/h.

Rationale—The equipment in Room R001 has not yet been specified. A heat gain of 1000 W or 3412 Btu/h is assigned to this room as a placeholder for future equipment. During detailed design, the actual equipment heat gain will be verified.

3.1.19 Outdoor Ventilation Air

It is assumed that all ASHRAE Standard 62.1 (Reference 2.2.2) outdoor air requirements are going to be adequately handled with infiltration air and air-handling unit make-up air to offset exhaust air requirements.

Rationale—The fundamental design principle for the tertiary confinement area of RF is the use of infiltration and engineered openings to cascade air throughout the building in order to maintain negative pressures between tertiary confinement areas and non-confinement areas. Because the design is in a very early stage, the number of people expected to occupy the building are relatively low (See Assumption 3.1.15), and infiltration and exhaust make-up is the fundamental design principle for maintaining confinement. It is reasonable to assume that the amount of outside air entering the spaces through infiltration and make-up will exceed the amount required by ASHRAE Standard 62.1 (Reference 2.2.2). During detailed design, the subsystems that serve areas containing people can be analyzed in more depth.

3.1.20 Support Areas

It is assumed that Rooms 1212 through 1224 can be modeled as one large space (room) for this load calculation. This is also the case for Rooms 1221 and 1205.

Rationale—Grouping the rooms together as one Support Area allows for a simplified approach to calculating the loads and airflows for the overall spaces. The impact on the overall calculation results would only be to the distribution of air and not to the total cooling and heating load required for the space, since all of the individual rooms would be modeled at the same temperature. As the individual rooms are better defined in detailed design, the individual room loads will be calculated.

3.1.21 Temperature of Personnel Vestibule Room 1021B

It is assumed that the Personnel Vestibule, Room 1021B, is equal to the outdoor ambient temperature and the walls adjacent to this room can be treated as walls with sunlit facing exteriors.

Rationale—The Personnel Vestibule, Room 1021B, is not accounted for in the RF heating and cooling load calculation for the non-confinement areas (Reference 2.2.24), therefore the internal temperature will rise and fall with the outdoor temperature. Thus, the most conservative approach for this calculation is to consider the room as non-existent. This assumption will be verified during the detailed design phase of the RF.

3.1.22 HVAC and Mechanical Process Equipment Sizes

The power ratings for the HVAC and mechanical process equipment are assumed as listed in Appendix E, Room Equipment Heat Gain List.

Rationale—The equipment list in Attachment 5 contains all of the HVAC and mechanical process equipment necessary to run the RF. The equipment motor horsepower shown in this list were based on the calculated horsepower rating from various Equipment Sizing and Selection

Calculation and shown in V&ID's as referred in Attachment 5. The actual power ratings for the HVAC and mechanical process equipment will be verified during the detailed design phase of the RF.

3.1.23 Refrigerated Dryer Package Heat Rejection

It is assumed that the heat rejection from GP Dryer Package is 120,596 Btu/h based on Vendor's Information for model no. NVC2000A. (Reference 2.2.28).

Rationale—The design of the GP Dryer Package located in Room 2012 is in the preliminary stage. The information is representative of similar packages throughout the compressor industry. As the design progresses to the detailed design phase, heat rejection from this equipment will be verified and updated appropriately.

3.1.24 Miscellaneous Equipment Heat Gain in Rooms 1002, 1017, 2007 and 2012.

It is assumed that there are miscellaneous equipment heat gain and future additional heat gain shown in Appendix E that are not known at this time in Rooms 1002, 1017, 2007 and 2012.

Rationale—In the revision of this calculation from the previous version, it is not necessary to remove conservative equipment heat gains at this time. Instead, the extra heat gain is categorized as a miscellaneous load. As the design progresses to the detailed design phase, it will be verified and updated.

3.2 ASSUMPTIONS NOT REQUIRING VERIFICATION

3.2.1 Hours of Operation

It is assumed that the RF will operate 7 days a week, 24 hours a day.

Rationale—It is expected that 7 days a week, 24 hours a day operation will be necessary to meet throughput requirements. But, whether it is necessary or not, an assumption of continuous operation will provide the most conservative bounding results for this calculation.

3.2.2 Outside Air Film Resistance for Calculating U-Values

The outside air film resistance during summer will be used in this analysis (Reference 2.2.4, Table 1, p. 25.2).

Rationale—Calculation of the airflow rate is based on calculated summer heat loads. Higher U-Values translate into higher calculated heat loads, therefore the use of a higher U-Value for the outside air film resistance gives a maximum bounding value.

3.2.3 Wall and Roof Color

A dark colored surface is assumed in determining the cooling load from sunlit walls and flat roofs, in order to provide an upper bounding solar radiation absorption component to the cooling load temperature differences generated.

Rationale—The assumption of a dark colored surface for the roof and walls in this calculation allows the use of a CLTD correction factor of 1.0; that maximizes the adjusted CLTD values. Because the color of the walls and roofs are not known at this time, assuming a dark color results in the most conservative upper bounding CLTD values.

3.2.4 F-factor for Slab on Grade

The F-factor for calculating heating loads from slab-on-grade floors is F = 0.73.

Rationale—This value is the maximum value allowed by Table 5.5-5 of the 2004 Energy Standard for Buildings Except Low-Rise Residential Buildings (Reference 2.2.6, p. 27). Using the maximum value allowed for calculating heating loads provides an adequate margin of safety.

3.2.5 Lighting Load to Space

For the calculation of cooling loads, it is assumed that 100% of the lighting load is transmitted to the space.

Rationale—For conservatism, assuming that 100% of the lighting load is transmitted to the space will provide a maximum, upper bounding, heat gain contribution from the lighting to the space.

3.2.6 Cooling Load Factor for Lighting

The lighting Cooling Load Factor (CLF) for every hour of the load calculation is equal to 1.0.

Rationale—Per Assumption 3.2.1, the RF is assumed to operate 7 days a week, 24 hours a day. Section 4.1 of the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3) states that a CLF value of 1.0 should be used when lights are on more than 16 hours a day.

3.2.7 Cooling Load Factor for People

The person CLF for every hour of the load calculation is equal to 1.0.

Rationale—Per Assumption 3.2.1, the RF is assumed to operate 7 days a week, 24 hours a day. It is noted from Table 4.6 of the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3), that the sensible heat cooling load factors for people would approach a value of 1.0 for people in the space 24 hours a day, since a CLF of 0.97 is listed in the table for people in the space for a total of 18 hours.

3.2.8 Cooling Load Factor for Equipment

The equipment CLF for every hour of the load calculation is equal to 1.0.

Rationale—Per Assumption 3.2.1, the RF is assumed to operate 7 days a week, 24 hours a day. It is noted from Table 4.11 of the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3), that the cooling load factors for equipment (unhooded appliances, motors, etc.), as shown in the table, would approach a value of 1.0 for equipment operating 24 hours a day, since a CLF of 0.98 is listed in the table for equipment operating 18 hours.

3.2.9 Air Handling Unit Configurations

It is assumed that all AHUs will be configured with a blow-thru fan configuration.

Rationale—The blow-thru configuration is assumed in order to keep the airflow values at a reasonable rate, by lowering the supply air temperature to the room to a value equal to the leaving coil temperature.

4. METHODOLOGY

4.1 QUALITY ASSURANCE

This calculation was prepared in accordance with procedure EG-PRO-3DP-G04B-00037, Calculations and Analyses (Reference 2.1.1). The Tertiary Non-ITS portion of the Surface Nuclear Confinement HVAC System discussed in this calculation is classified as Non-ITS in the Basis of Design for the TAD Canister-Based Repository Design Concept (Reference 2.2.10, Section 19.1.2) because during operation the HVAC systems do not mitigate the consequences of a radioactive release. Therefore, the approved version of this calculation is designated QA: N/A.

4.2 USE OF SOFTWARE

No software was used in this calculation.

4.3 METHODOLOGY

The calculation methodology outlined below is accomplished through the use of hand calculations.

- 1. Gather room information using the preliminary Receipt Facility General Arrangements (Assumption 3.1.1), and develop a Room Load Information Sheet for each room. Additionally, determine U-values for any roofs, walls, partitions, ceilings, and floors. See Appendix A for Room Load Information Sheets and U-Values for this calculation.
- 2. Calculate room-by-room cooling loads using the CLTD/CLF method and heating loads using the temperature difference method presented in the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3). Heating loads from slab-on-grade floors are calculated using the simplified slab perimeter method given by Equations 39 and 40 of 2005 ASHRAE Fundamentals (Reference 2.2.4, Chapter 29, p. 29.13). See Section 6.1.3 for cooling loads and Section 6.1.4 for heating loads.
- 3. Calculate room-by-room cooling loads from lighting, equipment and people, and include these loads in each room's total cooling loads. See Section 6.1.3.
- 4. Calculate each subsystem's airflow rate by summing all the peak space airflow rates belonging to each subsystem. This is a conservative approach since the rooms' peak cooling loads do not occur at the same time. See Section 6.2.1.
- 5. Calculate the minimum required outdoor air rate using ANSI/ASHRAE 62.1-2004, Ventilation for Acceptable Indoor Air Quality (Reference 2.2.2, Section 6.2). See Section 6.2.3.
- 6. Calculate the room-by-room space airflow rates based on the subsystem requirements. See Section 6.2.3 and Table 5.

- 7. Calculate the cooling and heating ventilation loads from the required outdoor air rates determined above. See Section 6.3.
- 8. Calculate the cooling (coil) load for each subsystem by determining the cooling coil entering conditions, the mixed air conditions based on the psychometric equations in Appendix D, and using cooling coil leaving conditions from Assumption 3.1.5. Thermodynamic properties of air entering and leaving the coil for each subsystem are shown in Appendix G. The mixed air is the mixture of the return air and the outside air. See Section 6.3.1.
- 9. Calculate the heating (coil) loads for each subsystem. See Section 6.3.2.
- 10. Calculate Infiltration/Cascade Air Cooling Load as presented in Appendix H.

5. LIST OF ATTACHMENTS

		Number of Fages
Attachment 1:	E-mail Regarding Waste Packages and Canisters Heat Gain Information	2
Attachment 2:	E-mail Regarding RF Electrical Equipment Heat Gain Information	5
Attachment 3:	E-mail Regarding Environmental, Safety & Health Equipment Heat Gain Information	12
Attachment 4:	E-mail Regarding Instrumentation and Controls Equipment Heat Gain Information	4
Attachment 5:	HVAC and Mechanical Process Equipment List	5
Attachment 6:	E-mail Regarding Mechanical Handling Group Equipment Heat Gain Information	3
Attachment 7:	E-mail Regarding the Number of Occupants in the RF Building	3
Attachment 8:	Second E-mail Regarding Mechanical Handling Group Equipment Heat Gain Information	3
Attachment 9:	E-mail Regarding Mechanical Handling Equipment Heat Gain Diversity Factor.	3

6. BODY OF CALCULATION

6.1 ROOM-BY-ROOM COOLING AND HEATING LOADS

6.1.1 Outdoor Design Conditions

This calculation uses the meteorological conditions at Mercury, Nevada for the cooling and heating load calculations, as directed in section 4.9.2.3.1 of the *Project Design Criteria Document* (Reference 2.2.1, p. 122). The following data is taken from Table 1A and 1B in Chapter 27 of 2001 ASHRAE Fundamentals Handbook (Reference 2.2.5):

Site: Mercury, Nevada
North latitude: 36.62°
West longitude: 116.02°

• Elevation: 3310 ft

• Heating Dry Bulb Temperature, 99.6% value: 24°F

• Cooling Dry Bulb/Mean Coincident Wet Bulb Temperatures, 0.4% value: 102°F/65°F

• Daily Temperature Range: 25.9°F

The 0.4% annual percentile design value for cooling and the 99.6% design value for heating are used for confinement and sensitive areas as directed by the Project Design Criteria Document (Reference 2.2.1, Section 4.9.2.3.1, p. 122).

6.1.2 Indoor Design Conditions

This calculation uses the summer and winter indoor design temperatures presented in Table 2, as a guide for assigning individual room design temperatures. As for humidity, the normally occupied areas the maximum dew point shall be 62.2°F. There are no established lower humidity limits for thermal comfort per ASHRAE 55-2004 (Reference 2.2.22, Section 5.2.2). Currently, no project requirements exist dictating the need for minimal humidity levels for special processes or equipment needs.

For winter design conditions, there is the possibility for the humidity levels to reach low percentage levels and humidification may be desirable in occupied areas, to reduce skin and eye dryness and in some areas to reduce static electricity generation. But it will not be addressed at this time, since the spaces, processes, and equipment for this facility have not yet been designed in detail.

75°F (summer)/72°F (winter) (Reference 2.2.26, Section 3.2)

Rooms/Areas Summer/Winter Normally Unoccupied Areas (with Occasional Short Term 90°F (summer)/65°F (winter) Occupancy): (e.g. Exit / Entrance Vestibules, Electrical & (Reference 2.2.26, Section 3.2) Mechanical Equipment Rooms, LID Bolting Room, and Chases) Cask Unloading Room, Loading Room 100°F (summer)/65°F (winter) See Note 1 79°F to 85°F; Use 79°F (summer)/65°F Cask Preparation Room, Cask Preparation Annex, Canister Transfer Room, Maintenance Room (winter) (Reference 2.2.26, Section 3.2) Corridors, Lobby 79°F to 85°F; Use 82°F (summer)/65°F (winter) (Reference 2.2.26, Section 3.2) **Battery Room** 77°F (summer)/77°F (winter) See Note 2

Table 2. Indoor Design Temperatures

NOTES:

Support Areas

- 1. These rooms are normally unoccupied and are similar to the Mechanical Equipment Room in Table 1, Chapter 25 of 2007 ASHRAE Applications (Reference 2.2.8), which recommends a maximum room temperature of the "Design Outdoor Temperature + 10°F = (112°F). Electrical equipment (such as a CCTV) within the room cannot sustain a room temperature higher than 104°F; therefore 100°F was used as a design room temperature for conservatism.
- 2. From Table 1, Chapter 25 of 2007 ASHRAE Applications (Reference 2.2.8).

6.1.3 Room-by-Room Cooling Load Calculation

As stated in Section 4.3, the cooling loads are calculated using the CLTD/CLF method presented in the Cooling and Heating Load Calculation Manual (Reference 2.2.3). For each room the cooling load is calculated by considering the cooling load contribution from the following load components: roofs, walls, partitions, lighting, people, and equipment. The equations used to calculate the various components of the cooling load are given in Appendix C. The specific values used in these equations are given in the Room Load Information Sheets presented in Appendix A. An explanation regarding the sources of the information contained in the Room Load Information Sheets is given at the beginning of Appendix A. U-values for roofs, walls, and partition types are calculated and presented at the end of Appendix A.

The unadjusted ASHRAE values for CLTDs are presented in Appendix B. The unadjusted roof CLTD values correspond to a Type-12 roof (6-in. h.w. concrete with 1 in. or 2 in. insulation) and a Type 1 roof (steel with 1 in. or 2 in. insulation), per Table 3.8 in the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3, p. 3.19). However, from note 4 of Table 3.8 of Reference 2.2.3, an effective CLTD of 29 is used for the Type-12 roof for each solar time, because the RF concrete roof has an R-value of approximately 30 (hr ft² F)/Btu greater than the Type-12 roof selected. Also, per note 4 of Table 3.8 of Reference 2.2.3, the CLTD values of a Type 2 roof are used for calculating the cooling load from the metal roof, because of a higher calculated resistance of the roof. The unadjusted CLTD values for the wall Types B and G (Reference 2.2.3,

Table 3.10, p. 3.21) are given in Appendix B. These wall types are determined from Table 3.9 of the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3, p. 3.20) by determining the best comparison of the RF walls with the types given in the table. Because the R-value of the RF thick concrete wall is not significantly greater than the Type B wall chosen, a CLTD correction per note 4 of Table 3.10 in Reference 2.2.3 is not required.

The unadjusted CLTD values in Appendix B need to be corrected for latitude-month, color, indoor design temperature, and outdoor design temperature before they can be used in the cooling load equations. See Appendix B for the equations used to correct the unadjusted roof and wall CLTD values. The Latitude and Month corrections for the roofs and walls are given in Table B-2. For the correction of the Roof CLTD and the Wall CLTD, the K-factor is equal to 1.0, based on Assumption 3.2.3. For the correction of the Roof CLTD, the f-factor is taken at 1.0 for conservatism. The monthly outdoor design temperatures used in this calculation are shown in Table B-3. The summer design conditions of 102°F dry bulb/65°F wet bulb were assigned to June, July, August, and September for a more conservative cooling load result. Table F-1 and Table F-2 present the room-by-room roof and wall load calculations, respectively, for the peak month and hour of each room. The roof and wall totals for each room are summarized in Table 3.

The CLF values are also provided in Appendix B, Table B-1. The CLF values for lighting, people, and equipment are all equal to 1.0, based on Assumption 3.2.6, Assumption 3.2.7, and Assumption 3.2.8, respectively.

Partition loads are handled in a simplified and conservative manner in this calculation. Partition loads, due to wall partitions, are considered only when there is a heat gain into the room or space. The negative load value is not considered for the spaces on the side of the partition that experience a heat loss. This method was chosen to make the hand calculations simpler, yet conservative, since not tracking down the heat loss from the multiple partitions and temperature differences that could be experienced by any single room saves time and yields a higher cooling load.

In order to determine the peak cooling load for each room, the maximum value of the sum of the roof, wall, partition, lights, people and equipment heat gains for all months and hourly times is determined. See Example A1.1 in the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3) for an example on how to determine the room peak cooling load. The peak month and hour for each room served by the RF HVAC system is given in Tables F-1 and F-2.

A summary of the cooling load calculation is given in Table 3, for both sensible and latent loads. For conservatism, a 20% factor of safety has been added to the room peak sensible and latent loads to account for duct heat gain and to account for any unknowns at this stage of the design (Assumption 3.1.3).

Subsystem designations are added in Table 3 to identify anticipated zoning of rooms with respective air-handling units.

Table 3. Cooling Load Summary

				SENSIBLE COOLING											T	LATENT							
	`.							SENSIB	LE COOLI	NG	1		1		ļ	T	LAT	ENT	Т				
Room No.	Room Name	Room Peak Mo/hr	Design Room Temp.°F	Roof Btu/h	Walls Btu/h	Partitions Btu/h	Floors Btu/h	People Btu/h	Lights Btu/h	Equip- ment Btu/h	Infilt- ration Btu/h	Room Sensible Btu/h	Factor of Safety	Total Room Peak Sensible Btu/h	People Btu/h	Infilt- ration Btu/h	Equip- ment Btu/h	Room Latent Btu/h	Factor of Safety	Total Room Peak Latent Btu/h			
Note 1	Note 1	Note 2	Note 1	Note 6	Note 7	Note 8	Note 9	Note 10	Note 11	Note 12	Note 13	Note 14	Note 15	Note 16	Note 10	Note 13	Note 12	Note 17	Note 15	Note 18			
			,		γ	T		AHU-	B (AHU-00	0001, 2 & 3)	T	Υ	Γ		ĭ		,	т				
1002	Lid Bolting Room	6/15	90	1,415	3,309	9,380	0.	1,000	13,515	132,327	9,752	170,698	1.2	204,838	800	0	0	800	1.2	960			
1003A	Corridor	6/15	82	0	557	5,472	0	0	5,242	307	10,180	21759	1.2	26,111	0	0	0, .	0	1.2	0			
1003B	Corridor	All	82	0.	0	7,500	0	0	8,437	205	0	16,142	1.2	19,370	0	0	0	0	1.2	0			
1003C	Corridor	6/15	82	0	471	1,584	0	0	5,079	0	6,965	14,099	1.2	16,919	0	0	0,	0	1.2	0			
1003D	Corridor	All	82	0	0	8,910	0	0	10,894	0	0	19,805	1.2	23,766	0	0	0,	0	1.2	0			
	HVAC Room (ITS HEPA Exhaust Train A)	6/20	90	0	3,374	2,620	0	0	33,038	62,678	321	102,031	1.2	122,437	0	0	0 ,	0	1.2	0			
1004A	HVAC Room (ITS HEPA Exhaust for Battery Room Train A)	6/16	90	0	1,920	0	0	0	6,143	8,794	750	17,607	1.2	21,128	0	0	0.,	0	1.2	0			
121210	Support Areas [Excluding Room 1221] (Assumption 3.1.20)	6/15	75	0 .	9,026	27,539	0	750	35,140	23,659	30,621	126,735	1.2	152,082	600	0	0.	600	1.2	720			
	Support Areas (Assumption 3.1.20)	6/15	75	3,617	0	0	0	0	5,488	4,027	0	13,132	1.2	15,758	0	0	0	0	1.2	0			
	Operations/Maintenance Storage Room	6/21	90	1,279	8,659	0	0	0	12,219	341	1,607	24,105	1.2	28,926	0	0	0	0	1.2	0			
2002A	Corridor	6/15	82	0	557	7,628	0	0 .	5,324	102	6,072	19,684	1.2	23,621	0	0	0	. 0	1.2	0			
2002B	Corridor	All	82	0	0	11,974	0	0	12,942	307	0	25,223	1.2	30,268	0	0	0	0	1.2	0			
2002C	Corridor	All	82	0	0	1,824	0	0	1,474	102	0	3,401	1.2	4,081	0	0	0	0	1.2	0			
2002D	Corridor	6/15	82	0	1,371	5,472	0	0	7,782	0	35,720	50,345	1.2	60,414	0	0	0.	0	1.2	0,			
	HVAC Room North (Process Area Supply)	6/16	90	3,458	4,828	0	0	0	33,038	15,916	1,607	58,847	1.2	70,616	0	0	0 -	0	1.2	0			
	HVAC Room North (Process Area Supply)	6/16	90	2,265	3,429	0	0	0	21,638	8,532	1,179	37,043	1.2	44,452	0	0	0.	0	1.2	0			
170012	Instrument and Electrical Shop	6/18	90	3,065	12,297	0	0	0	29,284	341	2,572	47,559	1.2	57,071	0	0	0 -	0	1.2	0			
2007	Canister Transfer Room	6/22	79	. 8,202	71,571	66,031	0	0	53,038	250,687	2,054	451,583	1.2	541,900	0	0	0	0	1.2	0			
1/11/1/	Receiver/Dryer Equipment Room	9/21	90	1,904	18,214	0	0	0	29,284	120,425	2,572	172,398	1.2	206,878	0	0	0	0	1.2	0			
	·		-			,		AHU	-C (AHU-	00004 & 5)					·				·				
1003E	Corridor	9/16	82	0	1,129	10,664	0	0	14,417	102 .	0	26,312	1.2	31,574	0	0	0	0	1.2	0			
1003F	Corridor	9/15	82	0	504	5,472	0	0	5,242	205	5,894	17,317	1.2	20,780	0	0	0	0	1.2	0			
1003G	Corridor	9/15	82	0	388	4,256	. 0	0	5,079	307	10,537	20,567	1.2	24,680	0	0	0	0	1.2	0			
1003H	Utility Chase	All	90	0	0	2,960	0	0	10,894	0	0	13,854	1.2	16,625	0	0	0	0	1.2	0			
1012	LLW Staging Room	6/17	-90	0	7,161	2,620	0	00	21,707	2,455	4,608	38,551	1.2	46,261	0	0	0	0	1.2	0			

		<u> </u>		SENSIBLE COOLING												LATENT							
			· · · · · ·	<u> </u>	Γ	Ι	T	SENSIB	LE COOLI	NG	1	T	T	Ι	ļ		LA1	ENT		T			
Room No.	Room No. Room Name		Design Room Temp.°F	Roof Btu/h	Walls Btu/h	Partitions Btu/h	Floors Btu/h	People Btu/h	Lights Btu/h	Equip- ment Btu/h	Infilt- ration Btu/h	Room Sensible Btu/h	Factor of Safety	Total Room Peak Sensible Btu/h	People Btu/h	Infilt- ration Btu/h	Equip- ment Btu/h	Room Latent Btu/h	Factor of Safety				
Note 1	Note 1	Note 2	Note 1	Note 6	Note 7	Note 8	Note 9	Note 10	Note 11	Note 12	Note 13	Note 14	Note 15	Note 16	Note 10	Note 13	Note 12	Note 17	Note 15	Note 18			
1014	Maintenance Room	All	79 [.]	0	0	12,165	O	0	10,376	27,378	0	49,919	1.2	59,903	0	0	0.	0	1.2	0			
1016	CTM Maintenance Room	All	90	0	0	2,620	0	0	9,215	1,952	0	13,787	1.2	16,544	0	0	0.	0	1.2	0			
1018	Electrical Room (Normal Power)	6/23	90	0	9,521	0	0	0	25,734	118,271	643	154,169	1.2	185,003	0 .	0	0	0	1.2	0			
1018A	Battery Room (Normal Power)	9/21	77	0	5,820	4,850	0	0	4,505	0	2,456	17,631	1.2	21,157	0	0	0.	0	1.2	0			
1019	HVAC Room (ITS HEPA Exhaust Train B)	9/22	90	0	5,511	0	0	0	33,038	62,678	321	101,548	1.2	121,858	0	0	0,	0	1.2	0			
1019A	HVAC Room (ITS HEPA Exhaust for Battery Room Train B)	9/21	90	0	3,485	0	0	0	6,143	9,751	750	20,130	1.2	24,156	0	0	0 .	0	1.2	0			
1028	Freight Elevator	6/16	90	1,150	10,811	0	0	0	2,130	0	0	14,091	1.2	16,909	0	0	o"	0	1.2	0			
1029	Elevator Lobby	9/15	82	0	5,237	1,920	0	0	3,522	102	31,612	42,394	1.2	50,873	0	0	0	0	1.2	0			
2002E	Corridor	All	82	0	0	10,680	0	0	18,184	512	0	29,376	1.2	35,250	0	0	0	0	1.2	0			
2002F	Corridor	6/15	82	0	557	7,628	0	0	5,324	102	6,072	19,684	1.2	23,621	0	0	0.	0	1.2	0			
2002G	Corridor	All	82	0	0	1,824	0	0	1,474	102	0	3,401	1.2	4,081	0	0	0	0	1.2	0			
2006	HVAC Room (HEPA Exhaust for Support, Decon and LLW Areas)	6/17	90	2,272	9,459	0	0	0	21,707	53,784	5,465	92687	1.2	111,224	0	0	0	0	1.2	0			
2009	HVAC Room South (Process Area Supply)	6/23	90	2,494	12,804	0	0	0	25,734	6,175	2,036	49,243	1.2	59,092	0	0	0	0	1.2	0			
2010	HVAC Room South (Process Area Supply)	9/22	90	2,149	9,150	0	0	0	33,038	12,472	1,607	58,416	1.2	70,099	0	0	0	0	1.2	0			
2011	HVAC Room South (Process Area Supply)	- 9/22	ã0 ·	1,407	6,498	0	0	0	21,638	6,638	1,179	37,360	1.2	44,832	0	0	0.	0	1.2	0			
2029	Elevator Lobby	9/15	82	0	8,566	3,104	0	Ō	3,276	102	20,896	35,945	1.2	43,134	0	0	0.	0	1.2	0			
3001	Corridor	Tertiary	82	1,225	2,858	874	0	0	2,294	0	3,751	11,001	1.2	13,201	0	0	0	0	1.2	0			
3029	Elevator Lobby	Tertiary	82	0	4,465	1,029	0	0	5,406	0	19,825	30,724	1.2	36,869	0	0	0	0	1.2	0			
	Freight Elevator Machine Room	Tertiary	90	4,158	6,507	0	0	0	7,700	3,412	0	21,777	1.2	26,132	0	0	0	0	1.2	0			

		SENSIBLE COOLING										LATENT								
Room No	Room Name	Room Peak Mo/hr	Design Room Temp. °F	Roof Btu/h	Walls Btu/h	Partitions Btu/h	Floors Btu/h	People Btu/h	Lights Btu/h	Equip- ment Btu/h	Infilt- ration Btu/h	Room Sensible Btu/h	Factor of Safety	Total Room Peak Sensible Btu/h	People Btu/h	Infilt- ration Btu/h	Equip- ment Btu/h	Room Latent Btu/h	Factor of Safety	Total Room Peak Latent Btu/h
Note 1	Note 1	Note 2	Note 1	Note 6	Note 7	Note 8	Note 9	Note 10	Note 11	Note 12	Note 13	Note 14	Note 15	Note 16	Note 10	Note 13	Note 12	Note 17	Note 15	Note 18
-	,							AHL	J-D (AHU-	00006 & 7)			-							
1013	Loading Room	All	100	0	0	0	0	0	12,901	132,327	0	145,228	1.2	174,274	0	0	0	0	1.2	0
1015	Cask Unloading Room	All	100	0	0	0	0	0	11,468	87,277	. 0	98,745	1.2	118,494	0	0	0 :	0	1.2	0
1017	Cask Preparation Room	6/15	79	7,104	10,753	39,813	0	1,500	45,939	375,760	23,825	504,694	1.2	605,633	1200	0	0 -	1,200	1.2	1,440
1017A	Cask Preparation Annex	9/19	79	0	4,810	10,640	0	500	10,717	2,083	0	28,749	1.2	34,499	400	0	0-	400	1.2	480
Totals				47,164,	265,578	276,520	0	3,750	708,245	1,532,697	253,451	3,069,692	1.2	3,683,630	3,000	0	0.	3000	1.2	3,600

NOTES:

- 1. Obtained from the Room Load Information Sheets in Appendix A
- 2. Determined using the Cooling and Heating Load Calculation Methodology on a room-by-room basis, outlined in Section 6.1.3. "All" means that the load is constant, room has no exterior exposure
- 3. Not Used
- 4. Not Used
- 5. Not Used
- 6. Roof loads come from Table F-1 in Appendix F
- 7. Wall loads come from Table F-2 in Appendix F
- 8. The sum of all of the partition loads from Appendix A information and Equation C-5 in Appendix C
- 9. There are no heat loads thru the floors
- 10. People loads (sensible and latent) are calculated using Equations C-7 and C-8 from Appendix C, where input values come from the Room Load Information Sheets in Appendix A
- 11. Lighting loads are calculated using EquationC-6 from Appendix C, where input values from the Room Load Information Sheets in Appendix A are multiplied by 3.413 to convert from Watts to Btu/h
- 12. Equipment loads are calculated using Equations C-9, C-10 and C-11 from Appendix C, where input values come from the Room Load Information Sheets in Appendix A
- 13. Infiltration loads come from Table H-1 in Appendix H
- 14. Summation of roof, walls, partitions, ceiling, floor, people, lighting equipment, and infiltration/cascade sensible loads
- 15. Factor of safety is assumed to be 20% (Assumption 3.1.3)
- 16. Total room sensible load with safety factor
- 17. Summation of people, equipment and infiltration latent loads
- 18. Total room latent load with safety factor

6.1.4 Room-by-Room Heating Load Calculation

The room-by-room heating loads are calculated using the equations presented in Appendix C. As stated in Section 4.3 the heating loads are calculated using the method presented in the Cooling and Heating Load Calculation Manual (Reference 2.2.3). Heating load due to conduction through the floors is calculated using the perimeter heat loss factor equation. Room information is taken from the Room Load Information Sheets presented in Appendix A.

Partition loads are handled in a simplified and conservative manner in this calculation. Partition loads due to wall partitions and ceiling partitions are considered only when there is a heat loss from the room or space. Heat gain is not considered for the spaces on the side of the partition that may experience it. This method was chosen in this calculation to make the hand calculations simpler yet conservative by not having to track down every heat gain or loss from the multiple partitions and temperature differences that could be experienced by any single room. If all partition and ceiling gains and losses were accounted for, then this total would be equal to zero.

A summary of the components of the heating load and the Total Room Heat Load for each space is presented in Table 4. For conservatism, a 20% factor of safety has been added to the room heat loads to account for any unknowns at this stage of the design.

Table 4. Heating Load Summary

		HEATING LOAD, Btu/h												
Room No.	Room Name	Roof	Wall	Partition	Floor	Infil- tration	Room Heat Load	Factor of Safety	Room Total Heat Load					
Note 1	Note 1	Note 2	1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7					
	. AF	IU-B (A	HU-00001	, 2 & 3)	······			,						
1002	Lid Bolting Room	2,517	24,805	0	1,287	38,952	67,560	1.2	81,072					
1003A	Corridor	0	1,173	0	269	24,398	25,840	1.2	31,008					
1003B	Corridor	0	0	0	0	0	0	1.2	0					
1003C	Corridor	0	992	0	239	16,694	17,925	1.2	21,510					
1003D	Corridor	0	0	0	0	0	0	1.2	. 0					
1004	HVAC Room (ITS HEPA Exhaust Train A)	0	9,561	0	0	1,284	10,845	1.2	13,014					
1004A	HVAC Room (ITS HEPA Exh for Battery Room Train A)	0	6,314	0	1,497	2,996	10,807	1.2	12,968					
1212 to 1224	Support Areas [Excluding Room 1221]	0	16,368	16,855	1,542	63,642	98,407	1.2	118089					
1221 and 1205	Support Areas	2,090	0	0	0	0	2,090	1.2	2,508					
2001	Operations/Maintenance Storage Room	2,275	24,534	0	0	6,421	33,230	1.2	39,876					
2002A	Corridor	0	1,173	0	0	14,553	15,726	1.2	18,871 ·					
2002B	Corridor	0	0	0	0	0	0	1.2	0					
2002C	Corridor	0	0	0	0	0	0	1.2	0					
2002D	Corridor	0	1,297	0	0	85,608	86,905	1.2	104,286					
2003	HVAC Room North (Process Area Supply)	6,152	15,875	0	0	6,421	28,447	1.2	34,137					
2004	HVAC Room North (Process Area Supply)	4,029	11,275	0	0	4,708	20,013	1.2	24,015					
2005	Instrument and Electrical Shop	5,453	33,645	0	0	10,273	49,370	1.2	59,244					
2007	Canister Transfer Room	9,876	106,707	0	0	4,280	120,863	1.2	145,035					
2012	Receiver/Dryer Equipment Room	5,453	33,915	0	0	10,273	49,641	1.2	59,569					
							Sub-sy Tota		755,241					
10005		,	AHU-0000	· ·										
1003E	Corridor	0	695	0	329	0	1,024	1.2	1,229					
1003F 1003G	Corridor	0	1,173	0	269	14,125	15,567	1.2	18,681					
1003G 1003H	Corridor Utility Chase	0	902	0	0	25,254	26,156	1.2	31,388					
1012				0	0	0	0	1.2	0					
1012	LLW Staging Room Maintenance Room	0	33,837		2,604	18,406	54,847	1.2	65,816					
1014	CTM Maintenance Room	0	0	0	0	0	0	1.2	0					
1018	Electrical Room (Normal Power)	0	22,460	0	1,347	2,568	26,375	1.2	31,650					
1018A	Battery Room (Normal Power)	0	8,996	0	2,244	6,087	20,375 17,326	1.2	20,792					
1019	HVAC Room (ITS HEPA Exhaust Train B)	0	9,561	0	0	1,284	10,845	1.2	1,3014					
	HVAC Room (ITS HEPA Exhaust for Battery Room Train B)	0	6,314	0	1,497	2,996	10,843	1.2	12,968					

		HEATING LOAD, Btu/h												
Room No. Note 1	Room Name Note 1	Roof Note 2	Wall Note 2	Partition Note 2	Floor Note 3	Infil- tration Note 4	Room Heat Load Note: 5	Factor of Safety Note 6	Room Total Heat Load Note 7					
1026	Stair #4	0	0	0	0	0	Ó	1.2	0					
1028	Freight Elevator	693	10,841	0	0	0	11,534	1.2	13,841					
1029	Elevator Lobby	0	3,428	0	688	75,763	79,880	1.2	95,856					
2002E	Corridor	0	0	0	0	0	0	1.2	0					
2002F	Corridor	Ö.	1,173	0	0	14,553	15,726	1.2	18,871					
2002G	Corridor	0	0	0	0	0	0	1.2	0					
2006	HVAC Room (HEPA Exh for Support, Decon & LLW Area)	4,042	48,401	0	0	21,830	74,272	1.2	89,127					
2009	HVAC Room South (Process Area Supply)	4,436	29,676	0	0	8,133	42,244	1.2	50,693					
2010	HVAC Room South (Process Area Supply)	6,152	15,875	0	0	6,421	28,447	1.2	34,137					
2011	HVAC Room South (Process Area Supply)	4,029	11,275	0	0	4,708	20,013	1.2	24,015					
2026	Stair #4	0	0	0	0	0	0	1.2	0					
2029	Elevator Lobby	0	6,255	0	0	50,081	56,335	1.2	67,602					
3001	Corridor	746	2,270	0	0	8,989	12,005	1.2	14,406					
3026	Stair #4	0	0	0	0	. 0	0	1.2	0 -					
3029	Elevator Lobby	0	4,262	0	0	47,512	51,775	1.2	62,130					
R001	Firefight Elevator Machine Room	2,505	8,061	0	0	0	10,567	1.2	12,680					
R026	Firefight Elevator Machine Stair	0	0	0	Ó	0	0	1.2	. 0					
							Sub-syste	m Total	678,896					
		,	AHU-0000	1		r	<u> </u>							
1013	Loading Room	0	0	. 0	0	0	• 0	1.2	0					
1015	Cask Unloading Room	0	0	0	0	0	0	1.2	0					
1017	Cask Preparation Room	8,554	21,197	0	0	49,653	79,403	1.2	95,284					
1017A	Cask Preparation Annex	0	6,043	0	629	0	6,672	1.2	8,006					
							•	Sub-system Total						
	Totals (Note 8)	60,448	513,089	16,855	13,812	599,213	1,203,414		1,547,388					

NOTES:

- 1. From information and data contained in Room Load Information Sheets in Appendix A. See the Room Load Information Sheets for any additional remarks about loads per room.
- 2. From Equation C-12 in Appendix C and specific values from Room Load Information Sheets in Appendix A.
- 3. From Equation C-13 and C-14 in Appendix C and data from Room Load Information Sheets in Appendix A.
- 4. From Equation C-15 in Appendix C and data from Room Load Information Sheets in Appendix A.
- 5. Sum of Roof, Wall, Partition, Floor, and Infiltration loads.
- 6. Factor of safety to account for unknowns.
- 7. Total of Room Heat Load multiplied by factor of safety.
- 8. Totals are given for informational purposes in order to get an indication of the overall loads in RF. They are not necessarily meant to indicate the heating load for any single HVAC subsystem.

6.2 SUBSYSTEM AIRFLOW RATES

6.2.1 Space Airflow Rates

To calculate the airflow rates required by each room the Total Sensible Heat Equation (Equation D-14, Appendix D) is rearranged to solve for CFM.

$$CFM = \frac{Q_s}{60 \cdot d \cdot (0.24 + 0.444W) \cdot (T_L - T_E)}$$
 (Eq. 2)

where

CFM = airflow rate, cu. ft./min

 Q_s = sensible heat gain, Btu/h

d = density of incoming air, lb/cu. ft. @ T_E

W = humidity ratio, lb water vapor/lb dry air

 T_L = dry bulb temperature of leaving air, °F

 T_E = dry bulb temperature of entering air, °F

= minutes per hour

0.24 = specific heat of dry air, Btu/lb °F

0.444 = specific heat of water vapor, Btu/lb °F.

For each room, the sensible heat gain, Q_s , is taken from the Total Room Peak Sensible value presented in Table 3. The density of air at 3,310 feet elevation can be calculated using the psychometric equations presented in Appendix D. For all rooms served directly by air-handling units, the entering air to the room is equal to the leaving coil temperature because the air-handling units are assumed to be configured with a blow-thru fan arrangement (Assumption 3.2.9). The room entering air temperature, T_E , is assumed at 51°F dry bulb and a corresponding wet bulb temperature shown in Appendix G based on the leaving cooling coil conditions (Assumption 3.1.5). The density of the entering air is equal to 0.068 lb/cu. ft. The humidity ratio of the incoming air is determined at the same conditions in lb water vapor/lb dry air shown in Appendix G. The quantity 0.444W equals 0.0029 and is treated as negligible. The leaving air temperature for each room is taken as the room design temperature for each particular room as indicated in the Room Load Information Sheets in Appendix A.

The rooms being cooled with cascaded air from adjacent rooms is dependent upon the temperature of the adjacent room from where the air comes. The values used in calculating the airflow rates and the results of the calculation are given in Table 5. Adjusted room sensible loads based on the rounded airflow rates are presented in Table 5. They represent the sensible cooling load capability of the airflow values selected for use in each room.

Subsystem designations are added in Table 5 to identify anticipated zoning of rooms with respective air-handling units. This allows a determination of total airflow requirements for subsystems as presented in Section 6.2.2.

Table 5. Space Airflow Rates

_																		·	Exhaust Sub- system
Room No. Note 1	Room Name Note 1	Design Room Temp T _L °F Note 5	Room Total Peak Sensible Btu/h Note 2	Airflow cfm Note 11	Density of Entering Air, p Ib/ft ³ Note 3	Cascade Constant 60 x	T _E °F Note 6	Sensible Load Btu/h Note 13	From Note 12	Required Airflow cfm Note 7	Use Airflow cfm Note 8	Adjusted Room Sensible Load Btu/h Note 9	Airflow cfm	T _L *F Note 5	To Note 14	Outside Air Infiltration @102°F cfm Note 1	Airflow cfm Note 15	Airflow cfm Note 16	Note 10
								· - · - · - · · · · · · · · · · · · · ·		U-00001, 2 ote 10	& 3)								
1002	Lid Bolting Room	90	204,838	540			102	Note 26	Note 19	5,364	5,370	205,074	910	90	Rm 1013	370	0	5,370	EXH-D
1003A	Corridor	. 82	26,111	0	<u>-</u>	-	-	0	<u>-</u>	860	870	26,409	0	-	-	570 ·	Note 18	Note 18	
1003B	Corridor	82	19,370	0	-	-	-	0	-	638	640	19,427	770	82	Rm 1005	O :	Note 18	Note 18	
1003C	Corridor	82	16,919	0	-	-	<u>-</u>	0		557	560	16,999	200	82	Rm 1017 & 1017A	390	Note 18	Note 18	
1003D	Corridor	82	23,766	0	-	-	, -	0	-	783	790	23,981	200	82	Rm 1014	0 .	Note 18	Note 18	
С	Corridor Totals			0		3		0			2,860	86,816	1,170			960	2,650	0	
1004	HVAC Room (ITS HEPA Exhaust Train A)	90	122,437	800	0.064	0.922	82	-5,898	Rm 2002A, B, C & D	3,052	3,060	116,858	0	-	-	30	0	3,890	EXH-D
1004A	HVAC Room (ITS HEPA Exhaust for Battery Room Train A)	90	21,128	200	0.064	0.922	82	-1,475	Rm 2002A, B, C & D	515	520	19,859	0	-	-	70 .	0	790	To ITS Train A Battery Room Exhaust
1212 to 1224	C2 Support Areas, Excluding 1221 (Assumption 3.1.20)	75	152,082	1,270 Note 20			102	Note 26	Rms 1203 & 1021A/B	6471	6480	152285	0	-	-		6350	1,400	EXH-D
1221 &1205	C2 Support Areas	75	15,758	0	-	-	-	0	-	671	680	15981	0	-	_	0	580	100	EXH-D
2001	Operations/Maint. Storage Room	90	28,926	0	-	-	-	0 -	•	757	760	29,023	0		-	150	910	Ó	
2002A	Corridor	82	23,621	0	-	-	-	0	<u>-</u> .	778	780	23,677	0	1	-	340	Note 18	Note 18	
2002B	Corridor	82	30,268	0	-		-	0	- .	997	1,000	30,355	0	-	-	0	Note 18	Note 18	
2002C	Corridor	82	4,081	0	-	-	-	0	-	134	140	4,250	0	<u>.</u> ·	-	0	Note 18	Note 18	
2002D	Corridor	82	60,414	390	0.063	0.907	90	2,830	Rm 2005	2,083	2,090	63,442	.1,000	82	Rm1004 &1004A	2,000	Note 18	Note 18	
С	Corridor Totals			390				2,830			4,010	121,704	1,000			2,340	5,740	0	
2003	HVAC Room North (Process Area Supply)	90	70,616	0	-	•	•	0	-	1,850	1,860	71,031	0	•	-	150	1,860	150	EXH-D
2004	HVAC Room North (Process Area Supply)	90	44,452	0	-	-	-	0	- -	1,164	1,170	44,681	0	•	-	110	1,170	110	EXH-D
2005	Instrument and Electrical Shop	90	57,071	0	-	-	-	0	-	1,494	1,500	57,283	390	90	Rm 2002 A, B, C & D	240	1350	0	

	. Inmut Data		*			Casada	Airflow In		•	e,	ıpply Air F	ilow.	Casa	ada Airf	low Out	Infiltration	Poturn Air	Evhauet Air	Exhaust Sub- system Note 10
Room No. Note 1	Input Data Room Name Note 1	Design Room Temp T _L °F Note 5	· -	Airflow cfm Note 11	Density of Entering Air, p Ib/ft ³ Note 3	Constant 60 x	T _E °F Note 6	Sensible Load Btu/h Note 13	From Note 12	Required Airflow cfm Note 7	Use Airflow cfm Note 8	Adjusted Room Sensible Load Btu/h Note 9	Airflow cfm Note 11	T _L °F	To Note 14	Outside Air Infiltration @102°F cfm Note 1	Airflow cfm Note 15	Airflow cfm Note 16	Note 10
2007	Canister Transfer Room	79	541,900	400	0.064	0.922	82	1,106	Rm 1028A, 1029, 2029, 3029 & 3001	19,805	19,810	543,142	1,300	79	Rm 1013	100	17,710		
		,											1,300	79	Rm 1015				
	Canister Transfer Room Total			400				1,106		19,805	19,810	543,142	2,600	79		100	17,710	0	
2012	Receiver /Dryer Equipment Room	90	206,878	0-	-	-	-	_	-	5,417	5.420	206,983	0	-	_	240 ;	0	5,660	EXH-D
	Sub-system Totals			3,600				-3,437		Total	53,500	1,670,090	6070			4,760	38,320		
AHU-C (AHU-00004 & 5) NOTE 10																			
1012	LLW Staging Room	90	46,261	450 Note 22	0.063	0.907	90	0	Rm 1014	1,211	1,220	46,590				180	0	1,850	EXH-D
1014	Maintenance Room	79	59,903	200	0.064	0.922	82	553	Rm 1003A thru D	2,205	2,210	60,593	200	90	Rm 1012	0 ,	0	2,210	EXH-D
1016	CTM Maintenance Room	90	16,544	0	-		-	-	-	433	440	16,803	440	90	Rm 1017	0	. 0	0	
1018	Electrical Room (Normal Power)	90	185,003	0	-	-	-	-	-	4,844	4,850	185,215	60	90	Rm 1018A	60	4,850		
1018A	Battery Room (Normal Power)	77	21,157	60	0.063	0.907	90	708	Rm 1018	859	860	21,895				110		1,030	To ITS Train B Battery Room Exhaust
1003E	Corridor	82	31,574	_	-	-		- .		1,040	1,050	31,873	770	82	Rm 1020	. 0	Note 18	Note 18	
1003F	Corridor	82	20,780	-	-		-	-	•	685	690	20,945				330	Note 18	Note 18	
1003G	Corridor	82	24,680	-	-		-	-	-	813	820	24,891				590 .	Note 18	Note 18	
1003H	Utility Chase	90	16,625		-	-	-	-	-	435	440	16,803				0	Note 18	Note 18	
2002E	Corridor	82	35250		-	-	-	-	-	1,160	1,160	35,250				0	Note 18	Note 18	
2002F	Corridor	82	23,621	50 Note 21			102	Note 26	Rm 2008	778	780	23,677				290	Note 18	Note 18	
2002G	Corridor	82	4,081	•			-	-	-	134	140	4,250				0	Note 18	Note 18	
Sub-total of Rms 2003E, F, & G		82		3,860	0.064	0.922	82	0	Rm 1029, 2029 & 3029			•	1,000 Note 25	82			Note 18	Note 18	
	Corridor Total			3,910				0			5,000	155,223	1,770			1,210	8,430	0	
2006	HVAC Room (HEPA Exhaust for Support, Decon and LLW areas	90	111,224	0	-	<u>-</u>	-	•	-	2,912	2,920	111,511	0		-	510	0	3,430	EXH-D

36

	Input Data					Cascade	Airflow In			Sı	upply Air F	·low	Casc	ade Airl	Now Out	Infiltration	Return Air	Exhaust Air	Exhaust Sub- system Note 10
Room No. Note 1	Room Name Note 1	Design Room Temp T _L °F Note 5	Room Total Péak Sensible Btu/h Note 2	Airflow cfm Note 11	Density of Entering Air, p Ib/ft ³ Note 3	Constant 60 x p x 0.24 Note 4	T _E °F Note 6	Sensible Load Btu/h Note 13	From Note 12	Required Airflow cfm Note 7	Use Airflow cfm Note 8	Adjusted Room Sensible Load Btu/h Note 9	Airflow cfm Note 11	T∟ °F	То	Outside Air Infiltration @102°F cfm Note 1	Airflow cfm Note 15	Airflow cfm Note 16	
2009	HVAC Room South (Process Area Supply)	90	59,092	0	-	-	-	•	_	1,547	1,550	59,193	0	-	-	190	1,590	. 150	EXH-D
2010	HVAC Room South (Process Area Supply)	90	70,099	0	-	- -	-	-	-	1,836	1,840	70,267	0	-		150 🔐	1,840	150	EXH-D
2011	HVAC Room South (Process Area Supply)	90	44,832	0	• .	-	-	-	-	1,174	1,180	45,063	0	-	-	110	1,140	150	EXH-D
1028	Freight Elevator	90	16,909	0		<u>-</u> ·		-	-	443	450	17,185	0	-		غ 0	450	0	
1029	Elevator Lobby	82	50,873	0	-	-		_	-	1,676	1,680	50,997	1,770	-	Rms 1003E, F & G	1,770	1,680	0	
2029	Elevator Lobby	82	43,134	0	•	-	-		-	1,421	1,430	25,516	1,170	<u>-</u>	Rms 2003E, F & G	1,170	1,430	0	
3029	Elevator Lobby	82	36,869	0	-	-	-	-	-	1,215	1,220	37,033	920	82	Rm 2003E, F & G	1,110	1,410	0	
3001	Corridor	82	13,201	0	_	_	-	-	-	435	440	13,356	400	82	Rm 2007	210	250	0	
1019	HVAC Room (ITS HEPA Exhaust Train B)	90	121,858	800	0.063	0.907	82	-5,804	Rm 1003E, F,G & 2002E, F & G	3,038	3,100 Note 24	118,385	0	-	_	30	0	3930	EXH-D
1019A	HVAC Room (ITS HEPA Exhaust for Battery Room Train B)	90	24,156	200	0.063	0.907	82	-1,451	Rm 1003E, F,G & 2002E, F & G	594	610 Note 24	23,295	0	<u>.</u>	-	70	0	880	To ITS Train B Battery Room Exhaust
R0001	Freight Elevator Machine Room	90	26,132	0	-	_	-	-	-	684	690	26,350	0	-	-	Ο .	0	690	EXH-D
	Sub-system Totals			5,620				-8,022		Total	31,770	1,094,970	7,330			7,180	23,070	29,240	TOTAL EXH-D
								,		HU-00006 ote 10	& 7) ·								
1013	Loading Room	100	174,274	1,300	0.065	0.936	79	-25,553	Rm 2007	3,100	3,100	148,740							
 		100		910	0.063	0.907	90	-8,256	Rm 1002	-172	-180	-8,637							
	Loading Room Total			2,210				-33,809			2,920	140,103	0			0	0	5,130	EXH-E
1015	Cask Unloading Room	100	118,494	1,300	0.065	0.936	79		Rm 2007	1,937	1,940	93,083	0	-	-	0	0	3,240	EXH-E
1017	Cask Preparation Room	79	605,633	800			102		Rm 1021 Note 23		22,090	605,654	0	-	-	360	0	23,190	EXH-E

	Input Data					Cascade	Airflow In			St	ıpply Air F	low	Casca	ade Airfl	ow Out	Infiltration	Return Air	Exhaust Air	Exhaust Sub- system Note 10
Room No. Note 1	Room Name Note 1	Design Room Temp T _L °F Note 5	Room Total Peak Sensible Btu/h Note 2	1	Density of Entering Air, p Ib/ft ³ Note 3	Constant	T _E °F Note 6	Sensible Load Btu/h Note 13	From Note 12	Required Airflow cfm Note 7	Use Airflow cfm Note 8	Adjusted Room Sensible Load Btu/h Note 9	Airflow cfm Note 11	T∟ °F Note 5	To Note 14	Outside Air Infiltration @102°F cfm Note 1	Airflow cfm Note 15	Airflow cfm Note 16	
1017A	Cask Preparation Annex	79	34,499	200	0.064	0.922	82	553	Rm 1003A, B, C & D	1,278	1,280	35,095	0	-	-	0	0	1,540	
				440	0.063	0.907	90	4,390	Rm 1016	160	160	4,386	0	-	<u>-</u>	0	0	600	
Cask	Preparation Annex Total		-	640				4,943			1,440	39,481	0	-	-	0	0	2,140	EXH-E
	Sub-system Totals		<u> </u>	4,950				-54,419			28,390	878,321	0			360	0	33,700	TOTAL EXH-E

NOTES:

- 1. From the Room Load Information Sheets in Appendix A.
- 2. From Table 3, Cooling Load Summary.
- 3. Density of the entering cascade air. Refer to Appendix D for the appropriate equations to calculate air density.
- 4. Constant based on the density of cascade air entering the room. Refer to Equation 2 in Section 6.2.1.
- 5. Temperature of Return Air leaving the room (dry bulb). This is the same as the design room temperature (dry bulb), which comes from the Room Load Information Sheets in Appendix A.
- 6. Temperature of Cascade Air entering the room. For conservatism of cooling load calculation, air cascaded from C1 areas used as outdoor air temperature instead of actual room temperature.
- 7. From Equation 2, using the "Room Total Peak Sensible" column, an entering air temperature 51°F, a density of air at 51°F, and accounting for the cascade load.
- 8. Airflow rates rounded up to the nearest 10 cfm.
- 9. Adjusted room sensible load comes from using the rounded airflow rates in Equation 2.
- 10. The supply (AHU) or exhaust (EXH) Sub-system serving the listed room.
- 11. Cascade air to balance room airflow and for proper airflow direction, see Assumption 3.1.10.
- 12. Room the cascaded air is coming from. . .
- 13. From Equation 2.
- 14. Room the cascaded air is going to.
- 15. Amount of air returned to the AHU.
- 16. Amount of air exhausted to the atmosphere.
- 17. These values are calculated using the mixed air equations in Appendix D.
- 18. Connected corridors can be considered as one space for exhaust and return airflow rates.
- 19. 540 cfm is cascaded from C1 Room 1001.
- 20. Value consists of 870 cfm cascaded from C1 Room 1021A/B and 400 cfm cascaded from C1 Room 1203.
- 21. 50 cfm is cascaded from C1 Room 2008.
- 22. Value includes 250 cfm cascaded from C1 Room 1011. (250 cfm is part of 430 cfm total infiltration to Room 1012).
- 23. 800 cfm is cascaded from C1 Room 1021. (800 cfm is part of 1160 cfm total infiltration to Room 1017).
- 24. For conservatism, the airflow rate value is retained from previous revision.
- 25. 800 cfm to Room 1019 and 200 cfm from Room 1019A.
- 26. The cascaded airflow loads is already accounted for in the room total peak sensible load.

6.2.2 Subsystem Airflow Rate

The total airflow rate for each Air Handling Unit in this calculation is determined by summing the peak room airflow rates in Table 5 for all the rooms that will be served by a system. The total airflow rates calculated in Table 5 for each expected subsystem as shown below in Table 6.

Subsystem No.	Area Served	Total Airflow Rate (cfm) Note 1
AHU-B (AHU-00001, 2 & 3)	1st and 2nd Floor North Areas	53,500
AHU-C (AHU-00004 & 5)	1st and 2nd Floor South Areas	31,770
AHU-D (AHU-00006 & 7)	Loading and Unloading rooms, Cask Preparation room and Annex	28,390

Table 6. Subsystem Airflow Rates

NOTE:

6.2.3 Required Outdoor Air Ventilation Rate

The required outdoor air ventilation rate is calculated after analyzing the system exhaust rates, and the minimum required outdoor air rates. It is assumed in Assumption 3.1.19 that the ASHRAE Standard 62.1-2004 (Reference 2.2.2) required outdoor air rate are satisfied with the amount of infiltration and exhaust make-up coming into the rooms and zones of the building. The exhaust rates for the rooms requiring exhaust are presented in Table 5.

The total infiltration air in this calculation (excluding the non-confinement areas) is 14,910 CFM, shown in Appendix H.

The ventilation air for Subsystem AHU-B serving the Northside ground and second level of the RF facility including C2 support areas is 15,180 cfm (supply airflow minus return airflow) as presented in Table 5.

The ventilation air for Subsystem AHU-C serving the Southside ground and second level of the RF facility is 8,700 cfm (supply airflow minus return airflow) as presented in Table 5.

The ventilation air for Subsystem AHU-D is 28,390 cfm. This subsystem is 100% makeup air supply to Rooms 1013, 1015, 1017, and 1017A which are exhausted 100% directly to atmosphere.

Exhaust for Battery Room 1018A is based on Chapter 25 of 2007 ASHRAE Applications (Reference 2.2.8) where it states that "the recommended H₂ concentration in the battery room is 2% or less of room volume. When no battery design information is available, a general ventilation requirement exhaust rate of 2 to 4 air changes per hour (ACH) may be adequate for preventing the hydrogen concentration in the battery room from reaching the explosive limits". However, from p. 26.8 of ASHRAE HVAC Applications – 2003 the minimum number of air changes per hour is five.

^{1.} From summation of all rooms assigned to a subsystem number in Table 5.

For conservatism of this calculation 5 ACH will be used to calculate for the ventilation air requirement for the battery room to prevent the hydrogen concentration in battery room from reaching explosive limit. The battery room ventilation required for hydrogen concentration dilution will be:

$$Q_{\text{VENT}} = \frac{\text{Volume} \times \text{ACH}}{60}$$

where

 Q_{VENT} = required ventilation airflow rate, CFM

Volume = 7,700 ft³ (volume of the battery room, obtained from area and height shown on Appendix A)

ACH = 5 air changes per hour required to prevent the hydrogen concentration in the battery room from reaching the explosive limits.

= conversion for 60 minutes per hour

$$Q_{VENT} = \frac{7,700 \times 5}{60}$$

$$Q_{VENT} = 642 \text{ CFM}$$

The ventilation airflow to the battery room is exhausted to outdoors, this is consistent with sound and practical engineering practice that: (1) exhausting the ventilation air will avoid accumulation of combustible H₂ gas in the space and (2) maintaining the room at negative pressure will prevent the escape/migration of combustible gas into the adjacent rooms.

As indicated in Table 5, the required airflow rate due to calculated heat load and maintain the non-ITS Battery Room (1018A) at indoor design temperature of 77°F is = 860 CFM. The total exhaust airflow rate from the non-ITS Battery Room is 860 CFM + 110 CFM (outside air infiltration to Room 1018A, see Appendix H) + 60 CFM (cascading air into the room from adjoining electrical equipment room) = 1,030 CFM. This value is greater than the required exhaust of 642 CFM.

6.3 COOLING AND HEATING COIL LOADS

6.3.1 Cooling Coil Load

The total cooling load is the load required by the chilled water coil. In this calculation, it is determined by calculating the load required to cool the return/mixed air or 100% outside air down to the leaving coil conditions. The conditions of the return air are required to determine the cooling load. This is accomplished by tracking the conditions of the air as it leaves the cooling coil and makes its way back to the air handling unit. The dry bulb temperature of the air leaving the cooling coil is assumed to be 51°F (Assumption 3.1.5) and the wet bulb temperature is as

shown in Appendix G for each corresponding air handling unit. The properties of the air leaving the coil are also presented in Appendix G.

Thermodynamic properties of moist air for each system were determined using psychrometric equations presented in Appendix D. The process of cooling the air from entering the coil to leaving coil conditions (supply air) is constant sensible cooling load process, where dew point temperature and humidity ratio are constant as shown in Appendix G.

As the supply air passes through the supply fan, it gains 6°F of sensible heat per Assumption 3.1.6. The properties of the air leaving the supply fan are presented in Appendix G.

6.3.1.1 Sub-Systems AHU-B and AHU-C

These air handling units are recirculating systems with a quantity of outside air mixed with return air. The cooling coil load is determined by using Equation D-16 in Appendix D. Air supply flow rates as determined on Table 5, density of air entering the coil, enthalpy of air entering the coil, and enthalpy of air leaving the coil are as shown in Appendix G. Summary of Sub-system cooling coil loads and airflow rates are shown in Table 7 below.

6.3.1.2 Sub-system AHU-D

These air handling units are 100% outside air. In this calculation, Cooling coil capacity is determined by calculating the load required to cool the 100% outdoor air down to the leaving coil conditions to maintain the room indoor design conditions. The cooling coil load is determined by using equation 16 in Appendix D. Air flow rates as determined in Table 5, density of air entering the coil, enthalpy of air entering the coil, and enthalpy of air leaving the coil are as shown on Appendix G. Summary of Sub-system cooling coil loads and airflow rates are shown in Table 7 below.

System No.	Total Airflow Rate cfm Note 1	Air Density Note 2	60 min/hr Note 3	h₁ Note 4	h₂ Note 5	Total Cooling Load Note 6
AHU-B (AHU- 00001, 2 & 3)	53,500	0.063	, 60	29.33	19.23	2,042,523
AHU-C (AHU- 00004 & 5)	31,770	0.063	60	30.15	19.23	1,311,389
AHU-D (AHU- 00006 & 7)	28,390	0.061	. 60	33.08	19.23	1,439,117

Table 7. Subsystem Total Cooling Loads

NOTES:

- 1. From Table 6
- 2. Density of air entering the coil in pounds per cubic feet from Appendix G.
- 3. Minutes per hour conversion
- 4. Enthalpy of air entering the coil in Btu/lb from Appendix G.
- 5. Enthalpy of air leaving the coil in Btu/lb from Appendix G.
- 6. Total cooling load for each subsystem

6.3.2. Heating Coil Load

The Sub-system heating load (total of room by room) plus the outside ventilation air is the load required by the hot water coil. Ventilation load is determined by using equation C-15 and outside ventilation air cfm shown in Appendix G and based on winter outdoor and indoor air design conditions of 24°F and 65°F respectively. The density of outside air at 24°F dry bulb and 3,310 feet elevation is approximately 0.0725 lbs/cu.ft. The summary of the subsystem total heating load is shown in Table 8.

Outside air Ventilation Load Room Heating Load Total Heating Load Air Density cfm **T1 T2** Btu/h Btu/h Btu/h System No. Note 1 Note 2 Note 3 Note 4 Note 5 Note 6 Note 7 AHU-B (AHU-15,180 0.0725 66.13 24 667,673 755,241 1,422,914 00001, 2 & 3) AHU-C (AHU-8,700 0.0725 65 24 372,394 678,896 1,051,290 00004 & 5) AHU-D (AHU-28,390 0.0725 65 24 1,215,206 103,290 1,318,496 00006 & 7)

Table 8. Subsystem Total Heating Loads

NOTES:

- 1. From Appendix G.
- 2. Density of air entering the coil in pounds per cubic feet
- 3. Winter rooms inside mixed air design condition per Appendix D, Equation D-13.
- 4. Winter outside air design condition.
- 5. Ventilation Load per Appendix C, Equation C-15
- 6. Total Room Heating Load for each subsystem from Table 4.
- 7. Total Heating Load is the sum of Room Load Heating Load and Ventilation Load.

= 400 tons

7. RESULTS AND CONCLUSIONS

The room by room cooling and heating loads were calculated in Sections 6.1.3 and 6.1.4. The results are shown in Tables 4 and 5, respectively, and not repeated here.

The room-by-room and subsystem airflow rates were calculated in Table 5 and in Section 6.2.2. The subsystem airflow rates are summarized in Table 6.

The required outdoor air rates were calculated in Section 6.2.3. The infiltration air rates are shown in Appendix H and the ventilation air rates for each subsystem are shown in Appendix G.

The total cooling and heating loads for each subsystem were calculated in Section 6.3. The results are summarized in Table 9, below.

Subsystem	Supply Airflow Rate cfm Note 1	Outdoor Air Rate cfm Note 5	Total Sensible Cooling Load Btu/h Note 2	Total Latent Cooling Load Btu/h Note 2	Grand Total Cooling Load Btu/h Note 3	Total Heating Load Btu/h Note 4
AHU-B (AHU- 00001, 2 & 3)	53,500	15,180	2,042,523	1,680	2,044,203	1,422,914
AHU-C (AHU- 00004 & 5)	31,770	8,700	1,311,389	0	1,311,389	1,051,290
AHU-D (AHU- 00006 & 7)	28,390	28,390	1,439,117	1,920	1,437,489	1,318,496
Grand Totals:					4,793,081	3,792,700

Table 9. Summary of Subsystem Airflow Rates, Cooling Loads, and Heating Loads

NOTES:

1. From Table 6

1 ton = 12,000 Btu/h

- 2. From Table 3
- 3. From Table 7
- 4. From Table 8
- 5. From Table G-1

The room by room exhaust flow rates were calculated and are shown in Table 5, respectively, and not repeated here. Table 10 contains the summary of airflow rates by exhaust subsystem.

Table 10. Summary Exhaust Airflow Rate

Exhaust Sub-system	Area Served	Exhaust Airflow (cfm)
EXH-D (EXH-00001, 2 & 13)	See Table 5 for areas served	29,240
EXH-E (EXH-00005 & 6)	Loading Room 1013, Cask Unloading Room 1015, Cask Preparation Room 1017, and Cask Preparation Annex 1017A	33,700
ITS Train A Battery Room EXH (EXH-00009 & 10)	HVAC Room 1004A (ITS HEPA Exhaust for Battery Room Train A)	1,670 Note 1
ITS Train B Battery Room EXH (EXH-00011 & 12)	HVAC Room 1019A (ITS HEPA Exhaust for Battery Room Train B), and Battery Room 1018A (Normal Power)	2,760 Note 2

NOTES:

Exhaust airflow will be combined with the ITS Train A Battery Room exhaust (Reference 2.4.6)

Exhaust airflow will be combined with the ITS Train B Battery Room exhaust (Reference 2.4.6)

All results are calculated using the best information available at the present stage of the design. The results of this calculation are reasonable for inputs. As the design progresses, all internal and external heat gains/losses will be re-evaluated.

APPENDIX A: ROOM LOAD INFORMATION SHEETS AND U-VALUES

The following room load information sheets were assembled using a variety of references:

Room Number and Name: From the General Arrangement Drawings (Assumption 3.1.1).

Room Area: Floor area take-off is from the General Arrangement Drawings (Assumption 3.1.1), where distance is measured from center of wall to center of wall and the total area is rounded to the nearest 10 square feet.

Room Height: Room height is from the General Arrangement Drawings (Assumption 3.1.1), where room height is measured from top of floor to the top of floor above or top of roof/partition.

Room Design Temperature (Summer/Winter): Assigned using the information presented in Section 6.1.2.

Room Design Relative Humidity (Summer/Winter): No requirement, not controlled.

Ventilation Confinement Classification: Assumption 3.1.7.

Roof U-Value: See the end of this appendix for U-Value calculations.

Roof Area: Taken to be equal to room area. Note, that for corridors with a 14 ft ceiling height, and an interstitial space or chase with a roof above the ceiling, the roof area above the interstitial space or chase is added to the roof area for the adjacent room, in order to account for that external load.

Roof Color: Roof color is not known at the time of this calculation. Conservatively, a dark roof color is assumed in this calculation (Assumption 3.2.3).

Wall Height: From the General Arrangement Drawings (Assumption 3.1.1). All wall heights are measured from top of floor to the top of floor above or top of roof/partition.

Wall Width: From the General Arrangement Drawings (Assumption 3.1.1), where distance is measured from center of wall to center of wall.

Wall Orientation: Relative to the true north arrow on the General Arrangement Drawings (Assumption 3.1.1).

Wall U-Value: See the end of this appendix for U-Value calculations.

Wall Area: Product of Wall Height and Wall Width or as noted. Also, for conservatism, the areas of any vents, grilles, pipes, and all doors are included in the wall area. Note, that for corridors with a 14 ft ceiling height, external exposure, and an interstitial space or chase above the ceiling, the wall area for the interstitial space or chase is added to the wall area for the adjacent room, in order to account for that external load.

Wall Group: Wall group type is determined by comparing the wall types from the General Arrangement Drawings (Assumption 3.1.1) with the wall types presented in the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3, Table 3.9, p. 3.20).

Wall Color: Wall color is not known at the time of this calculation. Conservatively, a dark wall color is assumed in this calculation (Assumption 3.2.3).

Floor F-Value: Taken conservatively as F = 0.73 (Assumption 3.2.4).

Floor Perimeter: Taken from the General Arrangement Drawings (Assumption 3.1.1), where distance is measured from center of wall to center of wall.

Partition U-Value: See the end of this appendix for U-Value calculations. When a room has multiple partitions, the two highest U-Values are used to calculate the room partition load. Exceptions are as noted on the individual Room Load Information Sheet.

Partition Area: Partition lengths and heights are taken from the General Arrangement Drawings (Assumption 3.1.1). All partition heights are measured from top of floor to top of partition, for conservatism. Exceptions are as noted on any individual Room Load Information Sheet.

Partition Temperature Difference: Taken as the temperature difference between the design room temperatures of the spaces on each side of the partition.

Ceiling U-Value: See the end of this appendix for U-Value calculations. When a room has multiple ceiling partitions, the two highest U-Values are used to calculate the room ceiling partition load.

Ceiling Area: Ceiling area is taken from the General Arrangement Drawings (Assumption 3.1.1).

Ceiling Partition Temperature Difference: Taken as the temperature difference between the design room temperatures of the spaces on each side of the ceiling partition.

Large Interior and Exterior Door U-Value, Area, and Temperature Difference: The U-Value for all of these doors is 1.15 Btu/h-ft²-°F and the areas are taken from RF Air Leakage Calculation (Assumption 3.1.12). Temperature difference is taken as the temperature difference between the design room or exterior temperatures of the spaces on each side of the door.

Light Type: The types of light fixtures are not known at this time. A two lamp fluorescent fixture is assumed and a ballast factor of 1.2 is used in rooms and corridors with a 14 ft ceiling height or lower. The lighting for all of the remaining spaces is assumed to be High Bay, Incandescent-type. (Assumption 3.1.2.)

Light Total Wattage: The light total wattage is not known at this time. A lighting density of 2 W/sq. ft is assumed in all rooms (Assumption 3.1.2), with 100% of all lighting load going to the space (Assumption 3.2.5). The Room Area value is used to determine the Lights Total Wattage for a room, even in instances where the area of the ceiling may be greater due to the presence of tunnel-type corridors and battery rooms with ceilings that do not go up to structure.

Light Ballast Factor: From Assumption 3.1.2 for Fluorescent lighting.

People Activity Type: Activity type is assigned by comparison of the type of space with the representative rates at which heat and moisture are given off by human beings in different states of activity, as presented in ASHRAE Fundamentals (Reference 2.2.4, Table 1, p. 30.4).

Number of People: Indicated on the Room Load Information Sheets of this appendix (Assumption 3.1.15).

People Q Sensible: Sensible heat gain is from ASHRAE Fundamentals (Reference 2.2.4, Table 1, p. 30.4).

People Q Latent: Latent heat gain is from ASHRAE Fundamentals (Reference 2.2.4, Table 1, p. 30.4).

Equipment: Equipment heat gain, sensible and latent, comes from Appendix E (Assumption 3.1.4).

Infiltration: Infiltration rates are based on the RF Air Leakage Calculation (Assumption 3.1.8).

				ROOM LOAD	INFORMATI	ON SHEET	1		
Room Nu	mber and	Name:	1002 Lid Bolting	Room					1
			<u> </u>	· T · · · · · ·	·				Remarks
Room Area Indoor Des		1980 tions	Rm. Height (ft) Summer DB, °F		Relative Hur	nidity		Not	
							c	ontrolled	
			Winter DB, °F	65	Ventilation C		Classificatio	n	Tertiary
External (Conduction					•	1		
Item	Height ft	Widtl ft	h Orien- tation	U Btu/h-ft ² F	Area ft ²	Wall Group	Color		Remarks
Roof		MATERIAL PROPERTY.		0.031	1980			Roof Type	e 12, 1'-6" concrete
Wall	64	43	NW	0.22	2750	В		Wall 1, 4'	concrete
Wall		ļ						*	
Door	o organ knjigothirati	8658-X-1011				'			·
Floor	4.375				F=0.73	W. C. C.	ATTE A	Perimeter	= 43 Feet
Internal C	Conduction	n							
	It	em		U Btu/h-ft² F	Area ft²	ΔT		Rem	arks
Partition (summer)			0.2	1470	10	Partition 1	, 4' Concret	e
Partition (winter)		4				No heat lo	ss through	partitions
Large Inte	rior Door (summer)	1.15	560	10			
Lights									
	Type W/sq. ft.				Total Watts			Remarks	
High			2	Factor 1	3960	See Assu	mption 3.1.2		
*	•			" '			• •		
People									
	tivity Type		No. of People	Q Sensi	ble Btu/h Ea.	Q Laten	t Btu/h Ea.		Remarks
Standir	ng, Light w Walking		4		250	i	200	See Assu	mption 3.1.15
Equipme	nt Heat Ga	ain	<u> </u>						
	Sensible		Q Latent						
E	3tu/h		Btu/h				Remarks		
13	32,327		0	From Equ	uipment Heat	Gain List, Se	ee Assumpti	on 3.1.4	
<u> </u>								<u> </u>	
Infiltratio	n								
Ai	irflow cfm					Remarks	<u> </u>		
	910		See Assumption	on 3.1.8. Infilt	ration airflow r	ate includes	540 cfm ca	scaded fron	n C1 Room 1001.
			<u> </u>						
Notes/Re	marks		<u>.</u>						
				•					

			1	ROOM LOAI	D INFORMATI	ON SHEET		•				
Room Num	ber and	Name:	1003A Corridor									
									Remarks			
Room Area	(sf)	640	Rm. Height (ft)	14				•				
Indoor Desig		tions	Summer DB, °F		Relative Hur	nidity	Co	Not ontrolled				
			Winter DB, °F	65	Ventilation C	onfinement		-	Tertiary			
External Co	onductio	n							· · · · · · · · · · · · · · · · · · ·			
Item	Height ft	Widtl	h Orien- tation	U Btu/h-ft² F	Area ft ²	Wall Group	Color		Remarks			
Roof						集工物			7.0			
Wall	14	9	NE	0.22	130	В		Wall 1	4' concrete			
Wall	• • • • • • • • • • • • • • • • • • • •			0.22				11011111	1 001101010			
Wall								<u> </u>	78.8.000.12			
Wall			· · ·									
Floor		10 a			F=0.73		Sp. Market	Perimet	er = 9 Feet			
Internal Co	nductio	n										
		em		U Btu/h-ft ² F	Area ft ²	∆T °F		Re	marks			
NE Partition	(summe	er)		0.2	990	8	Partition 1	Partition 1, 4' Concrete				
Partition (wi									h partitions			
SE Partition		ling (sun	nmer)	0.3	1620	8	Partition 2					
Lights					,							
Туре	•	\	N/sq. ft.	Ballast Factor	Total Watts			Remark	S			
Fluoresc	cent		2	1.2	1536	See Assur	nption 3.1.2	2				
			<u> </u>									
People												
Activ	ity Type		No. of People	Q Sensi	ble Btu/h Ea.	Q Latent	Btu/h Ea.		Remarks			
				ļ		<u> </u>						
						1		L				
Equipment		ain		1								
	nsible u/h		Q Latent Btu/h				Remarks					
	07		Stant	From Eq.	uipment Heat (on 3.1.4				
				1.5.,, 29,				en onti-f				
Infiltration												
Airf	low cfm					Remarks						
	570		See Assumption	n 3.1.8								
					•							
Notes/Rem	arks											
				•								
			See Assumptio	n 3.1.8								

				ROOM LOAI	D INFORMAT	ION SHEET				
Room Nu	mber and	Name:	1003B Corridor						T	
			T		1		<u> </u>		Remarks	
Room Are		1030	Rm. Height (ft)		<u> </u>					
Indoor Des	sign Condit	ions	Summer DB, °	F 82	Relative Hur	nidity		Not Controlled		
			Winter DB, °F	65	Ventilation C	Confinement	•	-	Tertiary	
External	Conductio	n		•						
Item	Height ft	Widt ft	h Orien- tation	U Btu/h-ft² F	Area ft ²	Wall Group	Color		Remarks	
Roof		1.34	地位 整套部门			120/4/4				
Wall					'					
Wall				*****						
Wall										
Door			*					,		
Floor			经数据的			Astrotic		*		
Internal C	onduction	1						-		
	Ite	em		U Btu/h-ft² F	Area ft ²	ΔT °F	-	Rem	narks	
NE Partiti	on and Cei	ling (sur	nmer)	0.3	2270	8	Partition	on 2, Gypsum Board		
Partition (winter)						1	oss through		
SW Partition (summer)				0.2	570	te				
Lights					· · · · · · · · · · · · · · · · · · ·	-				
				Ballast	Total					
Ту			W/sq. ft.	Factor	Watts			Remarks		
Fluore	scent		2	1.2	2472	See Assu	mption 3.1.	2		
						<u></u>				
People										
Ac	tivity Type		No. of People	Q Sensi	ible Btu/h Ea.	Q Latent	t Btu/h Ea.		Remarks	
	nt Heat Ga Sensible	in	Q Latent							
	Sensible Stu/h		Btu/h		•		Remarks			
	205			From Eq	uipment Heat	Gain List, Se	ee Assump	tion 3.1.4		
										
Infiltunti -	-				***************************************			-		
Infiltratio _A	n irflow cfm		<u> </u>	.		Remarks				
^	irilow cirri					remarks				
-										
Notes/Re	marks									
					٠			•		

				R	OOM LOAD	INFORMAT	ON SHEET	•				
Room Nu	ımber and	Name:	1003C C	orridor								
			г		1					Remarks		
Room Are		620	Rm. He		14							
ndoor De	sign Condit	tions	Summe	r DB, °F	82	Relative Hur	midity	c	Not ontrolled			
			Winter I	OB, °F	65	Ventilation C	onfinement	Classification	n	Tertiary		
External	Conductio	n										
Item	Height ft	Widtl ft	· tati		U Btu/h-ft² F	Area ft ²	Wall Group	Color		Remarks		
Roof		李清澈		1.7			4810		•			
Wall	14	8		NE	0.22	110	В		Wall 1, 4'	concrete .		
Wall												
Wall												
Door												
Floor	195.05	7.5.1	9			F=0.73	拉置度者	Orași de la companii	Perimeter	= 8 Feet		
Internal (Conduction	<u> </u>										
	14.				U Btu/h-ft² F	Area ft ²	ΔT °F		Dam	- 4		
Partition (em			0.2	990	8	Dortition 1	Remarks ition 1, 4' Concrete			
					0.2	990	0	 	ss through			
Partition (winter) Ceiling (summer/winter)				 -								
Ceiling (summer/winter)					<u> </u>			i no neat ga	am/ioss thro	ough partition		
Lights				 		· · · · · · · · · · · · · · · · · · ·	1					
Ту	ne l	١	N/sq. ft.	1	Ballast Factor	Total Watts		4	Remarks			
Fluore			2		1.2	1488	See Assu	mption 3.1.2				
				-		1.00	0007.000	p.::011 0: 1:2	'			
People	<u></u>	•					· · · · · · · · · · · · · · · · · · ·					
	tivity Type		No. of	People	O Sensi	ble Btu/h Ea.	OLaten	t Btu/h Ea.		Remarks		
	AIVILY TYPE		110.01	Сорю	Q OCHS!	ole Diam La.	. Q Lateri	t Blam La.		·		
F	-4.114.0-	•										
	nt Heat Ga Sensible	un	Q Lat	ent								
	Btu/h		Btu/	-	<u> </u>			Remarks				
Infiltratio	n				<u> </u>							
	irflow cfm		<u>_</u>				Remarks	;		-		
	390		See As	sumption	3.1.8							
		·										
Notes/Re	marks											
										٠		
		•										

				ROOM LOAD	INFORMAT	ION SHEET	•				
Room Num	ber and	Name:	1003D Corridor								
									Remarks		
Room Area	(sf)	1330	Rm. Height (ft)	14							
Indoor Desig	gn Condi	tions	Summer DB, °F	82	Relative Hur	midity	(Not Controlled			
			Winter DB, °F	65	Ventilation C	Confinement	Classification	on	Tertiary		
External Co	onductio	n									
Item	Height	Widtl ft		U Btu/h-ft² F	Area ft ²	Wall	Color		Demonto		
Roof	ft	11	tation	Diu/II-II F	1 11	Group	Color		Remarks		
Wall		60 %.	**************************************								
											
Wall											
Wall					 -	-					
Door		23 -34-4-24-2				ESTABLISM NO.	\$120/E886\$FFE				
Floor						Cus and	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				
Internal Co	nductio	<u> </u>				1	· .				
	It	em		U Btu/h-ft ² F	Area ft ²	ΔT °F		Rem	narks		
NW and SE			ner)	0.2	1150	18	Partition 1	, 4' Concret			
NW and SE	V and SE Partition 2 (summer)				920	8	Partition 1, 4' Concrete				
Partition (wi	Partition (winter)						No heat loss through partitions				
Ceiling (sun	nmer)			0.31	1330	8	Concrete	Floor (2nd F	Floor), 1'- 6" Thick		
Lights				•							
Туре		V	V/sq. ft.	Ballast Factor	Total Watts			Remarks			
Fluoresc			2	1.2	3192	See Assu	mption 3.1.2				
									100000000000000000000000000000000000000		
People					•						
	ity Type		No. of People	Q Sensit	ole Btu/h Ea.	Q Laten	t Btu/h Ea.		Remarks		
									,		
Equipment	Heat Ga	in	· · · · · · · · · · · · · · · · · · ·								
	nsible		Q Latent								
Btı	u/h		Btu/h				Remarks				
				_L							
Infiltration		- 1						·			
Airfl	low cfm					Remarks	; 				
·			·								
Notes/Des	auka										
Notes/Rem	arks										
							•		•		

		F	ROOM LOAD	INFORMATI	ON SHEET				
mber and	Name:	1003E Corridor	·····					1	
- (-6)	1700	Des Unight (ft)	144	1				Remarks	
			_	Relative Hur	nidity		Not		
		Winter DB °F	65	Ventilation C	onfinement			Tertiary	
Conductio	n								
Height ft	ft	tation	U Btu/h-ft² F	Area ft ²	Wall Group	Color		Remarks	
								0	
14	11	sw	0.113	150	G		Wall 2, M	etal Wall	
							*		
	も数数			F=0.73		The second second	Perimeter	= 11 Feet	
Conduction	n				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
110	em		U Btu/b-ft² F	Area	ΔT		Rem	arks	
		ner)	0.2		 	Partition 1			
			0.3	3390					
Partition (winter)									
			Ballast	Total			_		
scent			1.2	4224	See Assu	mption 3.1.2			
		1		1	1		,		
tivity Type		No. of People	Q Sensi	ble Btu/h Fa.	Q Latent	Btu/h Fa		Remarks	
					Q 2010			TOTAL	
nt Heat Ga	in								
		Q Latent	,	,		Damada			
		- Blu/II	From Eq.	inment Heat (on 3 1 /		
102			1 Tom Equ	aipment reat	Dairi List, Oc	se Assumpti	011 3.1.4		
		,							
									
irflow cfm					Remarks				
		<u> </u>							
marks									
		•	*						
		*							
	,								
	a (sf) sign Condition Conduction Height ft 14 Conduction It W Partition ions and C winter) pe scent	a (sf) 1760 sign Conditions Conduction Height ft ft 14 11 Conduction Item W Partitions (sumn ions and Ceiling (so winter) Pe scent Sensible Stu/h 102 n irflow cfm	a (sf) 1760 Rm. Height (ft) sign Conditions Summer DB, °F Winter DB, °F Conduction Height ft ft tation 14 11 SW Conduction Item W Partitions (summer) sions and Ceiling (summer) winter) Pee W/sq. ft. scent 2 ctivity Type No. of People Int Heat Gain Sensible Stu/h 102 Interpretation Summer A Latent Btu/h 102	a (sf) 1760 Rm. Height (ft) 14 sign Conditions Summer DB, °F 82 Winter DB, °F 65 Conduction Height Width Orienfit tation Btu/h-ft² F 14 11 SW 0.113 Conduction Item Btu/h-ft² F W Partitions (summer) 0.2 ions and Ceiling (summer) 0.3 winter) De W/sq. ft. Ballast Factor scent 2 1.2 Stivity Type No. of People Q Sension Int Heat Gain Sensible Stu/h Btu/h 102 From Equation	A	Area Area	a (sf) 1760 Rm. Height (ft) 14 sign Conditions Summer DB, °F 82 Relative Humidity Winter DB, °F 65 Ventilation Confinement Classification Height ft ft tation Btu/h-ft² F ft² Group Color 14 11 SW 0.113 150 G Conduction Item Btu/h-ft² F ft² Group Color Btu/h-ft² F ft² Group Color Ventilation Summer) 0.2 1580 8 Partition 1 ions and Ceiling (summer) 0.3 3390 8 Partition 2 winter) De W/sq. ft. Ballast Total Watts scent 2 1.2 4224 See Assumption 3.1.2 tivity Type No. of People Q Sensible Btu/h Ea. Q Latent Btu/h Ea. Int Heat Gain Sensible Btu/h Btu/h Remarks Toma Ensible Abtu/h Btu/h Remarks Toma Ensible Remarks Toma Ensible Remarks Toma Ensible Remarks Toma Ensible Remarks	Area Area	

			•	ROOM LOAI	DINFORMAT	ON SHEET			
Room Nu	ımber and	Name:	1003F Corridor				,		
									Remarks
Room Are	a (sf)	640	Rm. Height (ft)	14					
Indoor De	sign Condi	tions	Summer DB, °F	82	Relative Hur	nidity	С	Not ontrolled	
			Winter DB, °F	65	Ventilation C	onfinement	Classification	n	Tertiary
Evternal	Conduction	n		•	•				
LAterria	Height	Width	n Orien-	U	Area	Wall			
Item	ft	ft	tation	Btu/h-ft ² F		Group	Color		Remarks
Roof	4.7		I WE'S						
Wall	14	9	sw	0.22	130	В		Wall 1, 4'	concrete
Wall									
Wall									
Door									
Floor			\$ C. 64		F=0.73		有某人之	Perimeter	= 9 Feet
Internal (Conduction	n ·							
				U	Area	ΔΤ			
 -	lt	em		Btu/h-ft ² F	ft ²	°F		Rem	arks
SE Partiti	on and Cei	ling (sun	nmer)	0.3	1620	8	Partition 2	Gypsum B	oard
NW Partit	ion (summ	er)		0.2	990	8	Partition 1	e	
Partition (winter)						No heat lo	ss through	partitions
Lights									
				Ballast	Total				
Ту	pe [.]	V	V/sq. ft.	Factor	Watts			Remarks	
Fluore	scent		2	1.2	1536	See Assu	mption 3.1.2		
				•					
People									
Ac	tivity Type		No. of People	Q Sensi	ble Btu/h Ea.	Q Latent	Btu/h Ea.		Remarks
Equipme	nt Heat Ga	in							
	Sensible		Q Latent				-		
	Btu/h		Btu/h				Remarks		
	205			From Equ	uipment Heat	Gain List, Se	e Assumption	on 3.1.4	
								<u> </u>	
Infiltratio	n								
A	irflow cfm					Remarks			
	330	,	See Assumption	n 3.1.8					
Notes/Re	marks								
					•				•

Room Numb	er and	Name: 1			J IIII OIIIII	ION SHEET			
		name: 1	003G Corridor						1
		·			1				Remarks
Room Area (s		- 1	Rm. Height (ft)						
ndoor Design	n Condit	ions	Summer DB, °	F 82	Relative Hu	midity		Not Controlled	
			Winter DB, °F	65	Ventilation (Confinement	Classification	on	Tertiary
External Cor	nductio	n							
Item	Height ft	Width ft	Orien- tation	U Btu/h-ft ² F	Area ft ²	Wall Group	Color		Remarks
Roof						050			
Wall	14	7	sw	0.22	. 100	В		Wall 1, 4'	concrete
Wall .									
Wall									
Door							Street Control	<u> </u>	
Floor	¥8482.	4 4	4			的基件是	Y / 1947		
Internal Con	duction	า					, · · · · ·		
	!te	em		U Btu/h-ft² F	Area ft ²	ΔT °F		Rem	arks
SE Partition a	and Ceil	ling (sumr	mer)	0.3	1100	8	Partition 2	2, Gypsum B	loard
NW Partitions	s (sumn	ner)		0.2	1010	8		, 4' Concret	
Partition (win	ter)							ss through	
Lights									
Туре		W	/sq. ft.	Ballast Factor	Total Watts		•	Remarks	
Fluoresce	nt		2	1.2	1488	See Assur	mption 3.1.2		
. 100.0000				,	1100	00071000	inpuon o. i		
People									
	у Туре		No. of People	Q Sensi	ble Btu/h Ea.	Q Latent	t Btu/h Ea.		Remarks
	7 - 7 - 7			4 001101	210 D.W. CO.	Q Zatom	Diam La.		romano
Equipment H	leat Ga	in							
Q Sens	sible		Q Latent				_		
Btu/			Btu/h	1			Remarks		
307	<u> </u>			From Equ	uipment Heat	Gain List, Se	e Assumpti	on 3.1.4	
Infiltration				· · · · · · · · · · · · · · · · · · ·					
Airflo	w cfm					Remarks			
59	90		See Assumption	on 3.1.8					
Notes/Remai	rks								•

				ROOM LOAD	INFORMATI	ON SHEET	•		·		
Room Nu	mber and	Name:	1003H Utility Ch	ase					·		
	. 1	-			ſ · · · · · · · · · · · · · · · · · · ·		-		Remarks		
Room Area		1330	Rm. Height (ft)	18							
Indoor Des	ign Condit	ions	Summer DB, °F	90	Relative Hun			Not Controlled			
			Winter DB, °F	65	Ventilation C	onfinement	Classification	on	Tertiary		
External C	onductio	n									
Item	Height ft	Width ft	tation	U Btu/h-ft² F	Area ft ²	Wall Group	Color		Remarks		
Roof			171 326 150								
Wall											
Wall											
Wall											
Door											
Floor		ide v	4. (4)			1 7 1	全量多数				
Internal C	onduction	1			···	T	•		**************************************		
	Ite	em		U Btu/h-ft² F	Area ft ²	ΔT °F		Rem	arks		
NW and S	E Partition	s (summ	ner)	0.2	1480	10	Partition 1	, 4' Concret	te		
Partition (v	vinter)						No heat lo	ss through	partitions		
Ceiling (su	ng (summer/winter)						No heat g	ain/loss thro	through partition		
Lights					<u>, </u>	T					
Тур	e	٧	V/sq. ft.	Ballast Factor	Total Watts			Remarks			
Fluores		<u> </u>	2	1.2	3192	See Assu	mption 3.1.2				
					0.02	0007.000					
People	\						-				
Act	ivity Type		No. of People	Q Sensi	ble Btu/h Ea.	Q Laten	t Btu/h Ea.		Remarks		
Equipmen		in									
	ensible Itu/h		Q Latent Btu/h				Remarks				
Infiltration											
All	rflow cfm					Remarks					
Notes/Rer	narko										
MOTES/KEL	IIdi KS										
			•								
		٠						•			
			•								

				ROOM LOAI	INFORMAT	ION SHEET	•		
Room Nu	ımber and	Name: 1	004 HVAC Roo	om (ITS HEP	A Exhaust Tra	in A)			
									Remarks
Room Are	a (sf)	4840	Rm. Height (ft)	32					
Indoor De	sign Condi	tions	Summer DB, °F	90	Relative Hur	nidity	Co	Not introlled	
			Winter DB, °F	65	Ventilation (Confinement	Classification	on	Tertiary
External	Conduction	•							
External	Height	Width	Orien-	U	Area	Wall	<u> </u>	T	
Item	ft	ft	tation	Btu/h-ft ² F	ft ²	Group	Color		Remarks
Roof						Tagt			
Wall	18	59	NE	0.22	1060 ¹	В		Wall 1,	4' concrete
Wall									
Wall				,					
Wall									
Floor						2 / W. h-	医基型的		
Internal (Conductio	n			<u> </u>				
		em		U Btu/h-ft ² F	Area ft ²	ΔT °F		Re	emarks
Partition (summer)			0.2	1310	10	Partition 1	, 4' Conc	rete
Partition (h partitions
Ceiling									
Lights									
Ligitto		i.		Ballast	Total				
Ту	ре	w	/sq. ft.	Factor	Watts			Remark	s
High	Bay		2	1.0	9680	See Assu	mption 3.1.2	2	
People						•			
Ac	tivity Type		No. of People	Q Sensi	ble Btu/h Ea.	Q Laten	t Btu/h Ea.		Remarks
Equipme	nt Heat Ga	ain							
	Sensible		Q Latent						
	Btu/h		Btu/h				Remarks		
6	2,678			From Equ	uipment Heat	Gain List, Se	ee Assumpti	on 3.1.4	
		_							
	•					•			
Infiltratio	n				•				
A	irflow cfm					Remarks			
	30		See Assumption	n 3.1.8					
				,					
Notes/Re	marks								
1. Minus t	he area of	the 1003/	Corridor entra	nce (130 sq.	ft.) and the ar	nount of wal	II that is Roc	m 1004A	's exterior (700 sq.
				, ,	•				, -4
			,				•		

	•			ROOM LOAI	DINFORMAT	ON SHEET			
Room Nu	ımber and	l Name:	1004A HVAC Ro)	
				(,	Remarks
Room Are	a (sf)	750	Rm. Height (ft)	14					
Indoor De			Summer DB, °F		Relative Hur	midity	Co	Not ontrolled	
			Winter DB, °F	65	Ventilation C	Confinement	•		Tertiary
External	Conduction		,			• • •			
LAternar	Height	Width	Orien-	U	Area	Wall			
Item	ft	ft	tation	Btu/h-ft ² F	ft ²	Group	Color		Remarks
Roof			115			1445			
Wall	14	50	NE	0.22	700	В		Wall 1,	4' Concrete
Wall				•					
Wall									,
Wall									
Floor	计计划数				F=0.73			Perimet	er = 50 Feet
Internal C	Conductio	n							
	If	tem		U Btu/h-ft² F	Area ft²			Re	emarks
Partition (summer)						No heat g		h partition.
Partition (1		h partition.
Ceiling	•								•
Lights									
				Ballast	Total	T	*****	····	
Ту	pe	v	V/sq. ft.	Factor	Watts			Remark	s ·
Fluore	scent		2	1.2	1800	See Assu	mption 3.1.2	2	
		L				1 .			
People				 		<u> </u>		,	
Ac	tivity Type		No. of People	Q Sensi	ble Btu/h Ea.	Q Latent	t Btu/h Ea.		Remarks
								ļ	
Eaulama	nt Hoot C	 nin	· · · · · · · · · · · · · · · · · · ·					L	
QS	nt Heat Ga Sensible	aill	Q Latent						
	3tu/h		Btu/h	- -			Remarks		
	3,794			From Equ	uipment Heat	Gain List, Se	ee Assumpti	on 3.1.4	
				+ :					
Infiltratio	n								
Α	irflow cfm					Remarks			
	70		See Assumption	n 3.1.8					
Note - /P -									
Notes/Re	marks								
							•		
									•
			•						

					,				Remarks	
Room Are	a (sf) 3	180 Rm	. Height (ft)	32						
Indoor De	sign Conditi	ons Su	nmer DB, °F	90	Relative H	umidity	Not Co	ontrolled		
		Wii	nter DB, °F	65	Ventilation	Confinement	Classification		Tertiary	
External	Conduction	n								
	Height	Width	Orien-	U	Area	Wall		1		
Item	ft	ft	tation	Btu/h-ft ² F	ft ²	Group	Color		Remarks	
Roof	g Star VA									
Wall	32	43	NE	0.22	1380	В			l' Concrete	
Wall	32	44 ¹	NW	0.37	1410	В		Wall 3, 2	2' Concrete	
Wall	+		 							
Wall	wai Algarii Mada				F=0.72	Greek.		Daviss sta		
Floor	4		AND A STORY		F=0.73	List is a way of the	16 Mg 27 Youks	Perimete	er = 87 feet	
Internal C	Conduction	<u> </u>	Τ-		· · · · ·		1			
	Ita	em		U Btu/h-ft² F	Area ft ²	ΔT F		Rem	narks	
Partition (0.2	1310	10	Partition 1,			
Partition (ough partition.	
Ceiling				•						
Lights		•	•							
go				Ballast	Total	1				
Ту	ре	W/s	q. ft.	Factor	Watts			Remarks		
High	Bay		2	1	6360	See Assu	mption 3.1.2			
					L	<u></u>				
People										
					ble Btu/h	Q Latent Btu	/h	_	•	
Act	vity Type	N	o. of People	<u> </u>	a.	Ea.		Re	marks	
				-					*****	
	· · · · · ·	L		<u> </u>		 				
	nt Heat Ga	in	01-41				•			
	Sensible Btu/h		Q Latent Btu/h				Remarks			
	2,455			From Equ	uipment Hea	t Gain List, Se		n 3.1.4	72-71-11-11-11-11-11-11-11-11-11-11-11-11-	
						•	<u> </u>			
Infiltratio										
Air	flow cfm					Remarks				
	430	See	Assumption 3	.1.8. Infiltrat	ion airflow ra	ate includes 25	50 cfm cascad	ded from C	1 Room 1011.	
			-							
					•					
Notes/Re	marks									
		Room 101	1's exterior (30	ft)						
				• • • • • • • • • • • • • • • • • • • •		•				

				ROOM	I LOAD) INFORM <i>A</i>	TION SHE	EET			
Room Nu	mber and	Name: 1	013 Loading F	Room							
· · · · · · · · · · · · · · · · · · ·						ı — — — — — — — — — — — — — — — — — — —					Remarks
Room Are		1890	Rm. Height (1		32						
Indoor Des	sign Condi	tions	Summer DB,	°F	100	Relative H	umidity		Not Con	trolled	
			Winter DB, °f	=	65	Ventilation	Confinem	ent C	assification		Tertiary
External	Conductio	n									
	Height	Width			U	Area					
Item	ft	ft	tation	Btu	/h-ft ² F	ft ²	Grou	ıp	Color		Remarks
Roof	141. 4 40	in the second						25.22			
Wall	<u> </u>							_			
Wall	•			·				_			
Wall										*	
Wall											
Floor	[V] V V V V V V V V V	•	en en de de				- 350 C 100 S				•
Internal C	onductio	n						ı			
	I +	tem		Rfu	U /h-ft² F	Area ft ²	ΔT			Rem	arks
Partition (Dia	,,,,,,	 "		╁,	No heat gain		
Partition (No heat loss		
Ceiling										uoug	
Lights							·····				
Ligitis	·			R.	allast	Total			*		
Тур	ре	w	//sq. ft.		actor	Watts	I I		R	emarks	
High			2		1	3780	See A	ssum	otion 3.1.2		
		·						·			
People											
			,	C	Sensib	ole Btu/h	Q Latent	Btu/h			
Acti	vity Type		No. of People		E	a.	Ea.			Re	marks
									<u> </u>		
	nt Heat Ga	ain									
	Sensible Stu/h	.	Q Latent Btu/h				•	_	omorko		
	32,327		Btu/n	F.	om Fau	inmont Hos	t Cain Lint		emarks Assumption	2 1 4	
10	12,321				om Equ	принент пез	at Gaill LIST	ı, see		J. 1.4	
				_							
Infilt-ati-											
Infiltratio							Damas	40			
АП	low cfm				•		Remar	KS			
Notes/Re	marke										
140103/110	iiiai nə										

			~			INFORM	ATION	SHEET			
Room Nui	mber and	Name: 1	014 Maintena	nce Roo	om						Remarks
Room Area	(sf)	1520	Rm. Height	(ft)	32						Remarks
Indoor Des			Summer DE		79	Relative H	Humid	itv	Not Cont	trolled	
			Winter DB,		65	,			Classification		Tertiary
External C	Conduction	\n	111110100,			I					1
LAternar	Height	Width	Orien-		U	Area		Wall			
Item	ft	ft	tation	Btu/	h-ft² F	ft ²		Group	Color		Remarks
Roof		1					į	141			
Wall											
Wall											
Wall											
Wall											
Floor								44.00	84424 A		
Internal C	onductio	n									
					U	Area		ΔΤ			
		em			n-ft² F	ft ²		F		Rem	
Partition (s	····			0.2		1470		21	Partition 1, 4'		
Partition (s						2400		11	Partition 1, 4'		
Partition (s				C	.2	1185		3	Partition 1, 4'		
Partition (v	n (winter)							-	No heat loss through partitions		
Ceiling							1				
Lights			•								
T	_	187			llast	Total			_		
Typ High (VV/	sq. ft.		ctor 1	Watts 3040				emarks	
night	Бау		2		<u> </u>	3040	+	see Assur	mption 3.1.2		
			l								
People			T	1_							
Ac	tivity Type	a	No. of People	Q	Sensib Ea	le Btu/h	QL	atent Btu/ Ea.	'n	Rei	marks
	<u> </u>		, 555.5				-			110	·
Equipmen	t Heat Go	in	٠.				·		1		
	ensible		Q Latent	ľ	· ·						
	tu/h		Btu/h						Remarks		
27	,378			Fron	n Equi	pment Hea	t Gair	List, See	e Assumption 3	.1.4	
					·						
Infiltration	<u>. </u>										
Α	irflow cfm							Remark	s		
Notes/Ren	narks								•		
									•		

Room Nu	mber and	Name: 10	015 Cask Unic			INFORMA	TION SHEET				
									•	Remarks	
Room Area	a (sf)	1680	Rm. Height (ft)	32						
Indoor Des	sign Condit	ions	Summer DB	, °F	100 F	Relative Hu	umidity	Not Contr	olled		
			Winter DB, °	F	65	Ventilation	Confinement	Classification		Tertiary	
External (Conductio	n									
Item	Height ft	Width ft	Orien- tation	Btu/	U h-ft² F	Area ft ²	Wall Group	Color		Remarks	
Roof			1245		-						
Wall											
Wall											
Wall											
Wall											
Floor								i di kal-			
Internal C	onduction	1					1.12				
					U	Area	ΔΤ			,	
		em		Btu/l	h-ft² F	ft ²	F		Rem		
Partition ('					+		No heat gain th			
Partition (winter)							No heat loss th	rough	partitions	
Ceiling.											
Lights											
_				Ballast		Total		Domestic			
Тур			sq. ft.	Factor 1		3360	+	Remarks			
High	вау		2			3360	See assumption 3.1.2				
								•			
People			<u> </u>	· ·						-	
A	ctivity Type)	No. of People	Q Sensib			Q Latent Btu/ Ea.	/h	Rer	marks	
					•						
Equipmer	nt Heat Ga	in									
QS	ensible		Q Latent					· · ·			
	Btu/h		Btu/h					Remarks			
87	7,277			From	n Equip	ment Heat	Gain List, See	e Assumption 3.	1.4	· · · · · · · · · · · · · · · · · · ·	
							·				
Infiltratio	n	J,-						•			
	Airflow cfm			,			Remark	s			
<u>`</u>		•••									
Notes/Rei	marke										
140(63/1/6)		_									
•			,								

Room Nur	mber and	Name: 10	16 CTM Mair				TION SHEET			
										Remarks
Room Area	(sf)	1350	Rm. Height	(ft)	32					
Indoor Desi	ign Condi	tions	Summer DB	3, °F	90	Relative H	umidity	Not Contro	lled	
	•		Winter DB, 9	°F	65	Ventilation	Confinement	Classification		Tertiary
External C	onductio	on								
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	Wall Group	Color		Remarks
Roof			1				443 4 4			
Wall										
Wall				!						
Wali										
Wall										
Floor							5.3. E. F.	Balk Caraca		
Internal Co	onductio	n								
		em		Bt	U u/h-ft² F	Area ft ²	ΔT F		Rema	arks
Partition (s					0.2	1310	10	Partition 1, 4' C		
Partition (w						1	1	No heat loss thr		
Ceiling	/								~ ~	
						1				
Lights.	·		<u> </u>	r	Ballast	Total				
Тур	e	W/s	sq. ft.		Factor	Watts		Rem	arks	
High E			2		1	2700	See assur	mption 3.1.2		
People			_							
	ctivity Type	9	No. of People	(Q Sensib Ea		Q Latent Btu	/h	Per	marks
7.0	,		Тоорю	+		<u>'</u>			1101	Heiks
				1						
Equipmen	t Heat Ga	in						*****		
Q Se	ensible		Q Latent				,			
	tu/h	<u> </u>	Btu/h					Remarks		
1,	,952			Fr	rom Equi	pment Heat	Gain List, Se	e Assumption 3.1	.4	·
	•									
Infiltration		ı								
Α	irflow cfm						Remark	S		
,										
				,						•
Notes/Ren	narke				<u> </u>		****			
								•		
								٠		
		٠								
		٠								

Room No	umber and	Name: 10	017 Cask Pre	parati	on Room	· ·						
						-						Remarks
Room Are	ea (sf)	6730	Rm. Height	(ft)	72	Y-16-16-1-1-		,				
ndoor De	sign Condit	ions	Summer DE	3, °F	79	Relative H	lum	nidity		Not C	ontrolled	
			Winter DB,		65			onfinement	Classi	ficatio	n	Tertiary
External	Conductio		1									1
External	1	Width	Orien-					Wall	<u> </u>		1	
Item	Height ft	ft	tation	Bt	U u/h-ft² F	Area ft ²		Group	Co	olor		Remarks
Roof					0.031	6730					Roof Tvi	pe 12, 1'-6" concrete
Wall	12 ¹	74	SE		0.22	890		В				' Concrete
Wali	8 ²	91	NE		0.22	730		В				' Concrete
Wall	8 ²	91	SW	• • • • •	0.22	730		В		•		' Concrete
Wall			-				_					001101010
Floor						+				93000		
	Conduction	·									<u> </u>	
		•			U	Area		ΔΤ		-		
	Ite	em		Bt	u/h-ft² F	ft ²		F			Rem	arks
Partition ((summer)		0.2		3790		3	Parti	tion 1,	4' Concret		
Partition (ion (summer) iion (summer)				0.2	7840		11	Parti	tion 1,	4' Concret	e
Partition (0.2	1310		21	Parti	tion 1,	e	
Large Inte	e Interior Door (summer) e Interior Door (summer)			1.15 1.15		100		21				
Large Into						560						
Partition ((winter)			,					No h	eat los	ss through	partitions
Lights												
					Ballast	Total						
	pe	W/	sq. ft.		Factor	Watts	_		Remarks			
High	Bay		2		1	13460		See Assur	mption	3.1.2		
People			I						•			
,	ativity Tyma		No. of	'	Q Sensib		Q	Latent Btu	/h		D	
	ctivity Type ding, Light v		People	+	Ea	1.		Ea.	-			marks
Stant	Walking	vork,	6		25	0		200.)	ee Ass	sumption 3	1.15
	<u> </u>											
Equipme	nt Heat Ga	in	*	•								
	Sensible	···	Q Latent	_								
	Btu/h		Btu/h			•			Remar	ks		
3	75,760			Fi	rom Equi	pment Hea	t G	ain List, Se	e Assu	mptio	n 3.1.4	
Infiltratio	n											
	Airflow cfm							Remark	s			
	1160		See Assum	ption	3.1.8. Inf	iltration airf	low) cfm c	cascaded fr	om C1 Room 1021.
Notes/Re	marks											778
4 Minus	ha haiaht a	£ 46	ent support re			0 (0)	- E					•

KOOM NU	iniber and	Name: 10	17A Cask Pro	epara	uon Anne	X .					T
5		4570		· · · · ·	00						Remarks
Room Are		1570	Rm. Height	•	32	D-1-// :		1.014	.	-111	
Indoor De	sign Condit	ions	Summer DB		 	Relative F				ntrolled	<u> </u>
			Winter DB, o	`F	65	Ventilation	ı Co	onfinement	Classification		Tertiary
External	Conductio	n									_
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²		Wall Group	Color	Remarks	
Roof								化进行机			
Wall	· 32	21 ¹	SE		0.22	670		В		Wall 1, 4	l' Concrete
Wall						-	_				
Wall						-	_				
Wall	. 50 7 8 9 9					_	_	7584 (259 (25, 139			
Floor		Service (F=0.73	3			Perimete	er = 21 feet
Internal (Conduction	1				1					
	lt	em		Bt	U u/h-ft² F	Area ft ²		ΔT F		Rem	arks
Large Inte	e Interior Door (summer)				1.15	510		11	See Note 2		
	tion (winter)								No heat los	s through	partition.
	ling (summer)				0.31	470	i i	Concrete F	loor (2nd	Floor), 1'- 6" Thick	
Ceiling (s	ling (summer)			0.31		1100		11	Concrete F	loor (2nd	Floor), 1'- 6" Thick
Lights					•						
· Ty	pe ;	W/	sq. ft.		Ballast Factor	Total Watts			i	Remarks	
High	Bay		2		1	3140		See Assur	nption 3.1.2		
People											
	ctivity Type	e	No. of People	7	Q Sėnsibl Ea		Q	Latent Btu/	h	Re	marks
	ding, Light v		2		250			200	See Ass	umption 3	.1.15
	Walking							200			
	· · .										
	nt Heat Ga	iin	01								
	Sensible Btu/h		Q Latent Btu/h						Remarks		
	2,083				om Equir	ment Hea	t Ga		Assumption	3.1.4	·
								-, -			
India4":				_l_		· · · · · · · ·					
Infiltratio								Dema-4			
	Airflow cfm				·			Remark	5		
			L								

- will us the width of the adjacent support areas (9 feet)
 Since there are more than two partitions only the door is considered for the SW wall.
- 3. Adjacent corridor (1003G) is not considered, since the area is small and the temperature difference is low.

Room Nu	mber and	Name: 10	18 Electrical	Room	(Normal	Power)				1			
				·			******	. [Remarks			
Room Area (sf) 3770 Rm. Height Indoor Design Conditions Summer DB					32								
Indoor De	sign Condit	ions	Summer DB		90	Relative H		Not co	ntrolled				
			Winter DB, °	F	65	Ventilation	Confinement	Classification		Tertiary			
External	Conductio	n											
Item	Height ft	Width ft	Orien- tation	Btu	U /h-ft² F	Area ft ²	Wall Group	Color		Remarks			
Roof	7.12.23												
Wall	32	57	NW		0.22	1660²	В		Wall 1, 4	4' Concrete			
Wall	18	46	SW	(0.22	830	В		Wall 1, 4	4' Concrete			
Wall													
Wall										,			
Floor		11.2				F=0.73	TOP D	114421	Perimete	er= 45 Feet ¹			
Internal C	onduction	1											
Item				Btu	U /h-ft² F	Area ft ²	ΔT		Rem	emarks			
Partition (summer)							No heat gain through pa		partition.			
	Partition (winter)							No heat loss through partition.					
Ceiling													
Lights													
				R	allast	Total	T						
Ту	Type W/sq. ft.				actor	Watts		F	Remarks				
High	High Bay 2				1	7540	See Assu	mption 3.1.2					
						<u> </u>							
People													
	-		No. of	Q	Sensibl	e Btu/h	Q Latent Btu	/h					
A	ctivity Type)	People	<u> </u>	Ea		Ea.		Re	marks			
]											
Equipme	nt Heat Ga	in											
QS	ensible		Q Latent										
	3tu/h		Btu/h					Remarks					
11	8,271			From Equipment Heat Gain List, See Assumption 3.1.4									
		l											
Infiltratio	n												
	Airflow cfm						Remark	s					
	60		See Assump	otion 3	.1.8								
Notes/Re	marks						<u> </u>						
1. Perimet	ter does no	t include th	e exterior are	a that	is adjac	ent to Roon	n 1018A						
			adjacent Ro		_								
			•										

				ROOM LO	AD INFORMA	ATION SHE	EET				
Room Nu	mber and	Name: 10	18A Battery	Room (Norn	nal Power)						
										Remarks	
Room Are	a (sf)	550	Rm. Height	(ft) 14							
Indoor De	sign Conditi	ions	Summer DB	s, °F 77	Relative F	Relative Humidity		Not Co	ntrolled		
	Winter DB,		Winter DB,	F 77	Ventilatio	Confinem	nent Cla	ssification	,	Tertiary	
External	Conduction	n				· · · · · · · · · · · · · · · · · · ·				-4-0	
LAternal	Height	Width	Orien-	U	Area	Wal	u		<u> </u>		
Item	ft	ft	tation	Btu/h-ft ²	F ft ²	Grou		Color		Remarks	
Roof		desta	s a agr			1.2					
Wall	14	46	sw	0.22	640	В			Wall 1, 4	4' Concrete	
Wall	14	12	NW	0.22	170	В	İ			1' Concrete	
Wall											
Wall											
Floor	A. Oak	JANE			F=0.73	4.60		101	Perimete	er= 58 Feet	
Internal (Conduction)									
		 		U	Area	ΔΤ	.				
	lte	em		Btu/h-ft²		F		Remarks		arks	
Partition a	and ceiling (summer)		0.3	1200	13	Pa	rtition 2,	Gypsum E	Board	
SE Partiti	on (summe	r)		0.2	170	5			4' Concret		
	•										
Partition (winter)										
Ceiling											
Lights											
			·	Ballast	Total						
Ту	pe .	W/s	sq. ft.	Factor					Remarks		
Fluore	scent		2	1.2	1320	See a	ssumpti	on 3.1.2			
People											
			No. of	Q Sens	sible Btu/h	Q Latent	Btu/h		***************************************		
Α	ctivity Type	· · · · · ·	People		Ea.	Ea.			marks		
				ļ						`	
Equipme	nt Heat Ga	in									
	Sensible		Q Latent								
	3tu/h	`	Btu/h				Rem	narks	•		
		- ·									
			,								
Infiltratio	n										
	Airflow cfm					Ren	narks				
	110		See Assum	ption 3.1.8							
Notes/Re	marks										

Room Nu	mber and	Name: 10	19 HVAC Ro	om (I	TS HEP	A Exhaust T	rain B)						
											Remarks		
Room Area	a (sf)	4840	Rm. Height	(ft)	32								
Indoor Design Conditions Summer DI		Summer DE	s, °F	90	Relative H	umidity		Not Co	ontrolled				
	Winter DB,		Winter DB,	°F	65	Ventilation	Confineme	ent Cla	ssification	٠ .	Tertiary		
External (Conduction	n											
Item	Height ft	Width ft	Orien- tation	U Btu/h-ft ² F		Area ft ²	Wall Group		Color		Remarks		
Roof			1.6559				1841						
Wall	18	59	SW		0.22	1060 ¹	В			Wall 1, 4	l' Concrete		
Wall													
Wall													
Wall													
Floor	1 Sec. 1												
Internal C	onduction	<u> </u>		•	-								
ltem			Bt	U u/h-ft² F	Area ft ²	ΔT		Remarks					
Partition (summer)							N	o heat ga	in through	partition.		
Partition (winter)									s through			
Ceiling			,										
Lights													
Tvr	Type W/sq. ft.				Ballast Factor	Total Watts				Remarks			
High			2		1	9680	See As	sumpt	ion 3.1.2		· · · · · · · · · · · · · · · · · · ·		
											7.7110-2		
People						•	•			*-			
······································			No. of		Q Sensib	ole Btu/h	Q Latent B	3tu/h		•			
Α	ctivity Type		People	_	Ea	а.	Ea. '			Re	marks		
					•								
Equipmer	nt Heat Gai	in											
QS	ensible Stu/h		Q Latent Btu/h					Rer	narks				
62	2,678			F	From Equipment Heat Gain List, See Assumption 3.1.4								
,				1-			,		I				
						<u> </u>							
Infiltratio	n												
	Airflow cfm						Rem	arks					
	30		See Assum	ption	3.1.8								
Note = (D -											·		
Notes/Rei		L- 4000F	O		(420	4 \ = 4 4			-4:- F	404041			
1. Minus ti	ne area of t	ne 1003F	Corridor entr	ance	(130 sq.	π.) and the a	amount of v	wall th	at is Roon	1019A's	exterior (700 sq.		
		•											

			ROU	M LUAL	INFORMA	TION SHEET				
mber and	Name: 10	19A HVAC F	Room	(ITS HEF	PA Exhaust	for Battery Ro	oom Train B)			
					r				Remarks	
a (sf)	750	Rm. Height	(ft)	14						
ign Conditi	ions	Summer DE	3, °F	90	Relative H	umidity	Not co	ntrolled		
Winter DB, ^c			°F 65		Ventilation	Confinement	Classification	1	Tertiary	
Conduction	n									
Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	Wall Group	Color		Remarks	
		i ini								
14	50	sw		0.22	700	В		Wall 1,	4' Concrete	
250	CASA (S)	93448			F=0.73	2315		Perimete	er = 50 Feet	
onduction										
. Ite	em		Bt	U u/h-ft² F	Area ft ²	ΔT F		Remarks		
Partition (summer)										
Partition (winter)										
			l		•	, , , , , , , , , , , , , , , , , , , ,				
_ights Type W/sq. ft.					Total			D 1 -		
10			ŧ .					Remarks	<u> </u>	
Fluorescent 2				1.2	1000	See Assu	mpuon 3. 1.2			
A									•	
		No. of	т.	O Sonoib	lo Ptu/b	O Latont Phy	/h			
ctivity Type	1		'			Ea.	/ ¹¹	marks		
		•								
	,									
	in									
							Domarica			
		Dtu/II	F.	om Eau	nment Heet			214		
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			+-	oni Equi	ривии пеат	Gain List, Se	e Assumption	13.1.4	· · · · · · · · · · · · · · · · · · ·	
			+							
]										
irflow cfm						Remark	(S			
70		See Assum	ption	3.1.8						
narks										
									•	
	conduction Height ft 14 14 onduction Ite summer) vinter) e scent ctivity Type at Heat Galensible stu/h ,751	a (sf) 750 ign Conditions Conduction Height ft ft 14 50 Item summer) vinter) ee W/s cacent ctivity Type at Heat Gain ensible stu/h 751 inflow cfm 70	a (sf) 750 Rm. Height ign Conditions Summer DE Winter DB, Conduction Height ft ft Orientation 14 50 SW Onduction Item Summer) winter) De W/sq. ft. Scent 2 Cativity Type People At Heat Gain ensible stu/h At Heat Gain See Assum O See Assum	a (sf) 750 Rm. Height (ft) ign Conditions Summer DB, °F Winter DB, °F Winter DB, °F Winter DB, °F Conduction Height Midth Orientation Bt 14 50 SW Onduction Item Bt summer) winter) Be W/sq. ft. Filt Scent 2 Ctivity Type People At Heat Gain ensible Ru/h Stu/h Btu/h Stu/h Stifflow cfm TO See Assumption	a (sf) 750 Rm. Height (ft) 14 ign Conditions Summer DB, °F 90 Winter DB, °F 65 Conduction Height Width Orien- ft ft ft 1ation Btu/h-ft² F 14 50 SW 0.22 Onduction Item Btu/h-ft² F summer) winter) Ballast Factor scent 2 1.2 A No. of People Each of the Stu/h Btu/h A Stury Type People Each of the Stu/h Btu/h A Stury Type People Featury Btu/h A Stee Assumption 3.1.8	A (sf) 750 Rm. Height (ft) 14 Indicate the light of the	A (sf) 750 Rm. Height (ft) 14	Summer DB, °F 90 Relative Humidity Not co Winter DB, °F 65 Ventilation Confinement Classification Conduction Height Width ft 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Summer DB, °F 90 Relative Humidity Not controlled	

				ROO	M LOAD	INFORMA	ATION SHEET			
Room Nur	mber and	Name: 10	26 Stair #41							
			F			Т				Remarks
Room Area		400	Rm. Height		16					
Indoor Des	ign Condi	tions	Summer DE		102	Relative F		Not Conti	rolled	
			Winter DB,	°F	65	Ventilation	1 Confinement	Classification		Tertiary
External C			1			1		<u> </u>		
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	Wall Group	Color		Remarks
Roof							(1) (1)			
Wall								ļ		
Wall										
Wall			<u> </u>					ļ		
Wall		Pro reference Lot of the				-				
Floor	5 78	L COLDENS WORLDS						10.44.24		
Internal C	onductio	n					<u> </u>			
	[1	tem		Bt	U u/h-ft² F.	Area ft ²	ΔT F		Rem	arks
Partition (s	ummer)									
Partition (v	vinter)									
Ceiling										
Lights					,					
Тур	е	W/:	sq. ft.		Ballast Factor	Total Watts		Re	marks	
People							,			
	ctivity Typ	e	No. of People	•	Q Sensib	ole Btu/h a.	Q Latent Btu Ea.	ı/h	Re	marks
Equipmen	t Heat Ga	ain						,		
	ensible tu/h		Q Latent Btu/h					Remarks		
				\perp						
Infiltration	1									
Α	irflow cfm)					Remark	(S		
Notes/Ren							,			
1. This is a	non-con	ditioned spa	ace (Assump	tion 3.	.1.14)					
				•						
	•									

(sf) gn Condit onductio Height ft	260 ions	28 Freight El Rm. Height Summer DB				· · · · · · · · · · · · · · · · · · ·		,	
gn Condit onductio Height	ions	Summer DB	(ft)						
gn Condit	ions	Summer DB	(ft)						Remarks
onductio Height	•	Summer DB	`	90					
onductio Height	•		B. °F 90		Relative H	umidity	Not Co	ontrolled	
Height	n	Winter DB,		65			Classification		Tertiary
Height	n	William DB,	<u> </u>		70.7		0.00000	•	Totally
		1				<u> </u>		T	******
	Width ft	Orien- tation	Rtu	U /h-ft² F	Area	Wall Group	Color		Remarks
				.065	260	Group	00101	Roof Tyr	pe 1, Metal Roofing
72	15	NW		.113	1080	G			. 2, Metal Wall
									. 2, Metal Wall
									7.2.33.4
	10	INC	<u> </u>	.113	470			vvaii ivo.	. Z, Metal Wall
		4 10 10 4 5					EFP FE		
ab is sive , deete.		3 80 - 7 7					1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		********
onduction	1	т					r		
14.				U /L 42 F	Area	ΔΤ		D	
	2111		טוע/	ni-ii F	It	<u> </u>	No boot se		
inter)							No neat los	s through	partition.
							J		
€			1		1			Remarks	
cent		2	1.2		624	See Assu	mption 3.1.2		
		No. of	Q				/h		
tivity Type		People	Ea		1.	Ea.		Remark	
Heat Ga	in								
nsible						<u> </u>			
tu/h		Btu/h					Remarks		
			_						
									<u> </u>
						•••			
rflow cfm						Remark	s		
					7111127272	,			
						•			
narks							-		
.=									
	ite ummer) inter) cent tivity Type Heat Ga nsible u/h	26 18 Item Jammer) 26 18 NE Induction Item Ite	26 18 NE 0 Induction Item Btu Ite	26 18 NE 0.113 Item Btu/h-ft² F Jummer) Inter) Ballast Factor 2 1.2 No. of People Eactor Heat Gain Insible Uh Prilow cfm	26 18 NE 0.113 470 Induction Item U Area ft² Item U Hu/h-ft² F It² Item Item Item Item Item Item Item Item	Production Item U Area ΔT ft² F tt² F tt	Production Item	26 18 NE 0.113 470 G Wall No. Item Bu/h-ft² F ft² F No heat gain through inter) No heat loss through W/sq. ft. Ballast Factor Watts Event 2 1.2 624 See Assumption 3.1.2 No. of People Ea. Remarks Heat Gain Insible Q Latent Btu/h Remarks CHeat Gain Remarks Remarks	

Doom No		Nome: 10	29 Elevator L			INFORM	ATI	ON SHEET			3101-110
KOOM NI	ımber and	Name: 10	29 Elevator L	obby	•				· · · · · · · · · · · · · · · · · · ·		Remarks
Room Are	a (sf)	430	Rm. Height	(ft)	32						Remarks
1		Summer DB		82	Relative Humidity			Not	controlled	· · · · · · · · · · · · · · · · · · ·	
mador De	sign condi		Winter DB, °	'' 				onfinement			Tortion
			winter DB,	<u>'r</u>	[65]	ventilation	10	ommement	Ciassilicati	ion	Tertiary
External	Conduction										
14	Height ft	Width	Orien-	D4:	U µ/h-ft² F	Area ft ²		Wall	0-1		
Item	i ii	ft	tation,	D((J/N-IL F	π.		Group	Color		Remarks
Roof Wall	32	23 ¹	SW		2 4 4 2	740		I		Mell O Me	Act Mail
Wall	32	23	300		0.113	. 740		G		Wall 2, Me	tai vvaii
Wali	 										
Door											
Floor			1 1 2 2			F=0.7			建 多温度	Dorimotor r	- 22 Foot
						F=0.7	3	F 2.55 k	EXEL E.S	Perimeter =	= 23 Feet
Internal (Conduction	n .	Т			1		1			
	I+	em ⁻		D+ı	U µ/h-ft² F	Area ft ²		ΔT		Pom	narks
NE Partiti				0.2		480		8	Partition 1, 4' Concret		
	NE Partition (summer)				0.3			8			
	V Partition (summer) rtition (winter)				0.0				Partition 2, Gypsum Board No heat loss through partition.		
	winter		<u> l</u>						NO Heat IC	oss unough p	Jaiuuon.
Lights						1		<u> </u>			
Ту	nie.	\\//	sq. ft.		Ballast Factor	Total Watts				Remarks	
High		V V / S	2	1.2		1032		See Assur	nption 3.1.		444.
1 11911			-	-	1.4	1002		OCC ASSU	iipuoii o. i.		
D1-								<u> </u>	· · · · · · · · · · · · · · · · · · ·		
People			No. of		2 Sensib	lo Dtv/b		Latent Btu	<u></u>		
A	ctivity Type	e '	People	'	Sensib Ea		G	Ea.	"	Re	marks
	2 21		•		`	,					
Equipme	nt Heat Ga	in									
	Sensible		Q Latent								
	Btu/h		Btu/h					1	Remarks		
	102			Fr	om Equi	pment Hea	t G	ain List, Se	e Assumpti	on 3.1.4	
Infiltratio	n										
	Airflow cfm							Remark	s		
•	1770		See Assum	otion :	3.1.8			· Jonian	-		
	, 0		200.1004111								
					· · ·	<u> </u>					
Notes/Re	marks										
	ption 3.1.15	5									
·······································	p.:	-	•								•

				ROO	M LOAD	INFORMA	TION S	HEET				
Room Num	ber and	Name: 12	12 to 1224 S	uppoi	rt Areas [Excluding F	Room 12	21] (A	ssumption	3.1.20)	T	
	1 .				1						Remarks	
Room Area	` ,	4290	Rm. Height	(ft)	32		~~~~			•		
Indoor Desig	gn Condi	tions	Summer DB	, °F	75	Relative H	umidity		Not	Controlled		
			Winter DB, o	F	72	Ventilation	Confine	ement	Classificat	ion	Tertiary	
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	1	/all oup	Color		Remarks	
Roof		机模模量				1	7/2/1					
Wall	32	52	NE		0.22	1550 ¹		В		Wall 1, 4' (Concrete	
Wall			_									
Wall												
Wall			S 27 Jan 20 1988 3 3 3					VII. t Skelds.	E624 S 191 T S T T T			
Floor		医基础基				F=0.73	(A. A. S. a.	Alege.	化化物设备	Perimeter = 44 f		
Internal Co	nductio	<u>n</u>						,				
	It	em		Bt	∪ u/h-ft² F	Area ft ²		T F		Rem	arks	
Corridor Pa	rtition an	d Ceiling (s	ummer)	0.3		1800		7	Partition 2	2, Gypsum B	oard	
NW Partition	n (summ	er)		0.2		1270	1	5	Partition 1	I, 4' Concret	е ,	
Ceiling (sun	nmer)			0.31		4290	1	5	Concrete	Floor, 1'-6"	oor, 1'-6" Thick	
Corridor Pa	rridor Partition and Ceiling (winter)				0.3	1800	0 7	7	Partition 2	Partition 2, Gypsum Board		
NW and SW	V Partition	n (winter)		0.2		2690	0 7	7	Partition 1, 4' Concrete			
Ceiling (win	ter)				0.31	4290		7	Concrete	Floor, 1'-6"	hick	
Lights												
Туре		W/s	sq. ft.	Ballast Factor		Total Watts				Remarks		
Fluoresc	cent		2		1.2	10296	See	Assu	nption 3.1.	2		
People												
			No. of		Q Sensib	le Btu/h	Q Late	nt Btu/	/h		•	
Act	tivity Type	9	People		Ea	1		a.		Re	marks	
	ng, Light v	work,	3		25	0	20	00	See A	ssumption 3	.1.15	
v	Valking											
		•				I						
Equipment				-								
	nsible u/h		Q Latent Btu/h						Remarks			
	659		J.(J.)	Fr	rom Faui	pment Heat	Gain Li			on 3.1.4		
				 ' '	·	p.nont rical	. Juni Li	- t, OG	woulnipu	0.1 0. 1.7		
Infiltration		1										
Air	rflow cfm						R	emark	s	•		
	1270 ³		See Assum Room 1203	ption	3.1.8. In	filtration co	nsists of	870 c	fm from Ro	oms 1021A/	B and 400 cfm fro	
		,										
							· <u>-</u>	_				

- 1. Minus the exterior area of the 1003C corridor (112 sq. ft.)
- 2. Room 1017 is ignored for summer, since the one degree temperature differential is assumed negligible.
- 3. Reference 2.2.21, Section 7.2 indicates Rooms 1007A and 1006 which are now Rooms 1212 thru 1224 and 1205.

							TION SHEET	•		
Room Nu	mber and	Name: 12	221 and 1205	Support	Areas	(Assumption	on 3.1.20)	•		
Daa A	- (-6)	670	D 11-:	<u>a</u> ,	20 T					Remarks
Room Are	a (st) sign Condit	670	Rm. Height (32	Dalativa II		Net		
maoor De:	sign Condit	ions	Summer DB			Relative H			ontrolled	
			Winter DB, °	F	72	ventilation	Confinement	Classificatio	<u>n</u>	Tertiary
External	Conductio		· · · · · · · · · · · · · · · · · · ·						·T	
Item	Height ft	Width ft	Orien- tation	l Btu/h	J ı-ft² F	Area ft ²	Wall Group	Color		Remarks
Roof	1812			0.0	65	670			Roof Ty	pe 1, Metal Roofing
Wall						ļ	·	ļ		
Wall								<u> </u>		
Wall										
Wall	5-10-1-2-2-2-2	**************************************					contration is to see a contration of			
Floor	A. She		544				5.6396	Mai C		turrent in .
Internal C	Conduction	1								
	ite	em		L Btu/h		Area ft ²	ΔT		Rem	narks
Partition (summer)							No heat ga		
Partition (No heat lo		
Ceiling										
Lights								•		
				Bal		Total				
Туј		W/:	sq. ft.	Fac		Watts	 		Remarks	
High	Bay		2	1.	2	1608	See Assu	mption 3.1.2		
·										
People		•	,			• .		·		
_			No. of	Qs	Sensible		Q Latent Btu	/h	_	
A	ctivity Type		People	+	Ea.		Ea.		Re	marks
				+				.		
Equipme	nt Heat Ga	in .				. [
QS	Sensible		Q Latent							
	3tu/h		Btu/h					Remarks		
	4027			Fron	n Equip	ment Heat	Gain List, Se	e Assumptio	n 3.1.4	
·				+			****		 	
Infiltratio	n									
	Airflow cfm						Remark	 (S		
,										
			·							
Notes/Re	marks			•						
	-									

(sf)	Name: 20	001 Operation	s/Mai							
				ntenance	e Storage R	oom	·			
		·		г .					Remarks	
ian Condit	1790	Rm. Height	(ft)	32						
ign Condit	ions	Summer DE	3, °F	90	Relative H	umidity	Not Co	ntrolled		
		Winter DB,	°F	65	Ventilation	Confinement	Classification	1	Tertiary	
onductio	n									
Height ft	Width ft	Orien- tation	Rtı	U u/h-ft² F	Area ft ²	Wall Group	Color	Remarks		
a Ligar							00101	Roof 1	1'-6" concrete	
32										
		_				-				
				0.22	1.200	1 .		**************************************	- CONTOICE	
						1				
	7 64 1					18 15 A. L.	111111111111111111111111111111111111111			
		erace # m.n.omacii zwakowa woogalek k			L	Coulty Your kn				
lte	em.		D+.	U J/b-ft ² F	Area	ΔΤ		andre.		
	2111		טונ	arti-it i	- "	F	No heat gai			
						 	140 Heat 103.	3 till Odgir	parution.	
							I			
					Total					
e			1					Remarks		
Bay		2	1		3580	See Assur	nption 3.1.2			
					1		·			
tivity Type)	No. of People			1	Q Latent Btu Ea.	/h	Re	marks	
-			-							
t Heat Ga	in	<u></u>			L		I			
ensible		Q Latent			,					
tu/h		Btu/h								
341		* "	Fre	om Equi	pment Heat	Gain List, Se	e Assumption	3.1.4		
	- .		-							
···			- 1							
						Remark	s			
150		See Assum	ption 3	3.1.8			-			
			•							
iarks									•	
								•		
						٠				
	tivity Type t Heat Gaensible tu/h trflow cfm	32 46 32 39 conduction Item ummer) inter) A Heat Gain ensible en/h 41 rflow cfm 150	32 39 NW Item Item Immer) Initer) W/sq. ft. Bay 2 Itivity Type No. of People It Heat Gain Insible Q Latent Btu/h A1 Iflow cfm 150 See Assum	32 46 NE 32 39 NW Donduction Item Bto ummer) inter) W/sq. ft. F Bay 2 tivity Type No. of People t Heat Gain ensible Q Latent Btu/h Btu/h H1 Fr rflow cfm 150 See Assumption	32 46 NE 0.22 32 39 NW 0.22 Description Item Btu/h-ft² F Ummer) Inter) Ballast Factor Bay 2 1 The People People Ear It Heat Gain Insible Q Latent Btu/h Btu/h Btu/h See Assumption 3.1.8	32 46 NE 0.22 1470 32 39 NW 0.22 1250	32 46 NE 0.22 1470 B 32 39 NW 0.22 1250 B	32 46 NE 0.22 1470 B 32 39 NW 0.22 1250 B	32 46 NE 0.22 1470 B Wall 1, 4	

		1.		ROO	M LOAD	INFORMA	TION SHEE	Т			
Room Nu	mber and	Name: 20	02A Corrido	<u>r . </u>			12.0				· 1 - · · · · · · · · · · · · · · · · ·
	 				1	1					Remarks
Room Are	a (sf)	650	Rm. Height	(ft)	14						
Indoor De	sign Condit	ions	Summer DE	3, °F	82	Relative F	umidity		Not Co	ntrolled	
			Winter DB,	°F	65	Ventilation	Confinemer	nt Cla	ssification		Tertiary
External	Conductio	n									
Item	Height •	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	Wall Group		Color		Remarks
Roof		to the same	4.444				\$474 A				
Wall	14	9 ¹	NE		0.22	130	В			Wall 1, 4	l'concrete
Wall .											
Wall											
Wall											
Floor	102445								EA FA	,	
Internal (Conduction							T			
	lte	em		Bt	U u/h-ft² F	Area ft ²	ΔT F			Rem	arks
SE Partiti	on and Ceil	ing (summ	er)		0.3	1660	8	Pa	rtition 2, G	Sypsum B	oard.
NW Partit	ions (summ	ner)			0.2	1010	8	Pa	rtition 1, 4	' Concrete	e
Partition (winter)							No	heat loss	through p	partition.
Floor (sur	nmer)				0.39	650	8	Co	ncrete Flo	or (2nd F	loor): 1'- 6" Thick
Lights											
				E	Ballast	Total					
Ту	oe	W/s	sq. ft.	F	Factor	Watts			F	Remarks	
Fluore	scent		2		1.2	1560	See Assi	umpti	on 3.1.2		
People											
-			No. of		Q Sensib	le Btu/h	Q Latent Bt	tu/h			
Α	ctivity Type	1,,	People		Ea	n.	Ea.			Re	marks
										.	
				l_							
Equipme	nt Heat Ga	in									
	ensible		Q Latent								
	Stu/h		Btu/h						narks		
	102			Fr	rom Equi	pment Hea	Gain List, S	ee A	ssumption	3.1.4	
					•						
1694							·····				
Infiltratio	n Airflow cfm						D	rko			
·····	340		Con Assu-	ntics	210		Rema	IKS			
	340		See Assum	puon	J. 1.0						
Notes/P-											
Notes/Re	-										
ı. Assum	otion 3.1.15										

					M LOAD) INFORMA	ATIC	ON SHEET			
Room Nu	mber and	Name: 20	02B Corridor	•				7*1			Description
Room Are	o (cf)	1580	Dm Hoight	(f4)	14	<u> </u>					Remarks
	sign Condi		Rm. Height Summer DB		82	Relative H	Jum	idit.	Not Co	ntrolled	
indoor Des	sign Condi	lions	Winter DB,		65			onfinement C	_		Tortion
			winter DB,	<u>г</u>	05	ventilation	ı Cc	Jimnement C	iassilication	<u> </u>	Tertiary
External	Conduction		1	•		1	 1				
Item	Height ft	Width ft	Orien- tation	Btı	U µ/h-ft² F	Area ft ²		Wall Group	Color		Remarks
Roof	- 47/5/5/4				W/11-16 1	,,,	-	Group	- 00101		Remarks
Wall		ZOWER CARREST ME	FA-8213 ga/2891 FE								
Wall							寸				
Wall											
Wall			1								
Floor	: [44] 46)								1411		
	onductio	3.57 SUPPRIE WIRE C. 128-8-				•	r			•	
c.iiai C		••			U	Area		ΔΤ	· · · · · · · · · · · · · · · · · · ·		
	- 11	tem		Btu	u/h-ft² F	ft ²		F		Rem	narks
NE Partition	on and Ce	iling (summ	er)		0.3	3550		8	Partition 2,	Gypsum E	Board
NW Partit	ion (summ	er)			0.2	150		8	Partition 1,	4' Concre	te
Partition (winter)								No heat los	s through	partition.
Floor					0.39	1030		8	Concrete FI	oor (2nd f	Floor): 1'- 6" Thick
Lights											
Тур	ре	W/s	q. ft.		allast actor	Total Watts			(Remarks	
Fluore	scent		2		1.2	3792		See Assum	ption 3.1.2		
	,										
People											
Α	ctivity Typ	e	No. of People	(Q Sensib Ea		Q	Latent Btu/h Ea.		Re	marks
							l				
Equipme	nt Heat Ga	ain									
	iensible Btu/h		Q Latent Btu/h					В	emarks		
	307		Diu/II	Fr	om Faui	nment Hea	t Ga	ain List, Assu		<u> </u>	
			***	+''	om Equi	priicintrica	. 00	ani Liot, Moot	пприон э.т.	-	
				+							
Infiltration	n										,
	Airflow cfm			-				Remarks			
<i></i>	OLIOWA CILLI							Nemarks			
		,									
					'	-					
Notes/Re	marks										
											
								··········			

Room Ni	ımber and	Name: 200	02C Corridor		LOAL	OIAII/	ATION SHEE	•			
			020 00111001								Remarks
Room Are	a (sf)	180	Rm. Height	(ft)	14						
Indoor De	sign Condi	tions	Summer DB	, °F	82	Relative F	lumidity		Not Cont	rolled	
			Winter DB, o	·F	65	Ventilatio	Confinemer	nt Cla	ssification		Tertiary
External	Conduction	on									
Item	Height ft	Width ft	Orien- tation	Rt	U u/h-ft² F	Area ft ²	Wall Group		Color		Remarks
Roof	73.34.42.63				<u> </u>	<u> </u>	7 4 51	N.	00101		Terrains
Wall		The Control of the Co					5.13462.10.188930.11111	EAXE .			
Wall								\top			
Wall						į.					
Wall										•	
Floor								n li	ell die eller die el eller die eller die		
Internal (Conduction	n									
		em		Bti	U u/h-ft² F	Area ft ²	ΔT			Rem	arks
Ceiling ar	nd Partition	s (summer)			0.3	580	8	Partition 2, Gyp		/psum B	Board
NW Partit	ion (summ	er)		0.2		270			Partition 1, 4' Concrete		te
Partition (winter)							N	o heat loss t	hrough	partition.
Ceiling								<u> </u>			
Lights											
Ту	ne :	W/s	q. ft.		Ballast Factor	Total Watts	1		Re	marks	
Fluore			2	•	1.2	432	See Ass	umnt		inans	
								<u> </u>			
People	,			·			•				
			No. of	Τ.	Q Sensib	le Btu/h	Q Latent Bi	u/h			1
	ctivity Type	е	People	_	Ea		Ea.			Re	marks
				_							
· · · · · ·											
Equipme	nt Heat Ga	nin									
	Sensible	(Q Latent					_			
	Btu/h 102		Btu/h	-	om Faul	nmont Use	Coin Lint A		narks		
	102			+-	om Equi	pinent nea	t Gain List, A	ssum	puon 3.1.4.		
Infiltratio		I		1.	• •						
	Airflow cfm		•				Rema	rke			
	MINOW CITT						пеша	INO			
		-									
						·					
Notes/Re	marks										

				ROO	M LOAD	INFORMA	ATION SHEE	<u> </u>	#.4M	
Room Nu	mber and	Name: 20	02D Corrido	•						
 										Remarks
Room Are		950	Rm. Height	(ft)	14					1
Indoor De	sign Condi	tions	Summer DE	8, °F	82	Relative F		Not contr	olled	
			Winter DB,	°F	65	Ventilation	n Confinemen	Classification		Tertiary
External	Conductio	n								
	Height	Width	Orien-		υ	Area				
Item	ft	ft	tation	Bt	u/h-ft² F	ft ²	Group	Color		Remarks
Roof							3 H & A			
Wall	14	10	NE ON		0.113	140	G			No. 2, Metal Wall
Wall	14	10	SW		0.113	140	G		Wall I	No. 2, Metal Wall
Wall	-									
Wall Floor			6 (1.1.4)		***					
	.13.1							A Company of the Company		
internal C	Conduction	n				1 .		1		
	It	em		Bt	U u/h-ft² F	Area ft ²	ΔT		Rem	narks
SE Partition		ling (summ	er)		0.3	2280		Partition 2, Gy		
Partition (J (No heat loss th	•	
Ceiling	•									h
Lights						•				
go		-		 F	Ballast	Total				
Ту	ре	W/s	q. ft.		actor	Watts		Rei	marks	
Fluore	scent		2		1.2	2280	See Assu	mption 3.1.2		
People										
_			No. of	- 0	Q Sensib		Q Latent Btu	ı/h	, _	
A	ctivity Type	e	People	+	Ea	3.	Ea.	<u> </u>	Re	marks
				+						
	nt Heat Ga									
	Sensible Stu/h	'	Q Latent Btu/h					Remarks		
		1.	- Cturri	-				TOMANO		
				\top						
	·									
Infiltratio	n									
	Airflow cfm	1					Remark	(S	·	
·	2000		See Assum	ption	3.1.8		rtoman			
									•	
							•			
Notes/Re	marks	,							•	
								•		
							•			

Room Nu	mher and	Name: 20	002E Corridor		AD INFOR	MAT	ON SHEET			
Noom Nu	inber and	ivanie. 20	JOZE COMIGO	-						Remarks
Room Area	a (sf)	2220	Rm. Height	(ft) 14	,		•			·,
Indoor Des	ign Condit	tions	Summer DB	, °F 82	Relative	Hur	nidity	Not Control	lled	
			Winter DB,		Ventilat	ion C	onfinement	Classification		Tertiary
External 6	Conductio	n	, , , , , , , , , , , , , , , , , , ,		· · · · · · · · ·		-		L	
Item	Height ft	Width	Orien- tation	U Btu/h-ft ²	Ar F ft	ea	Wall Group	Color		Remarks
Roof							8115			
Wall			·				7, 2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3,			
Wall						- " -				
Wall					-				••••	
Wall										
Floor							4424	SHAIRE.		
	onduction	n								
		em		U Btu/h-ft ²	Are F ft	ea 2	ΔT		Rema	rke
SW Partiti		iling (sumr	ner)	0.3	44		8	Partition 2, Gyps		· · · · · · · · · · · · · · · · · · ·
Partition (ig (Suith	,	0.0	777		 	No heat loss thr		
Ceiling	WII ILOT J							140 110033 (11)	ough p	arutori.
					1					
Lights			· · ·	Ballas	t To	tal	Τ			
Тур	oe ·	W/	sq. ft.	Facto				Rem	arks	
Fluore			2	1.2			See Assu	mption 3.1.2		
People					•					
	ctivity Type	9	No. of People	Q Ser	nsible Btu/h Ea.	7	Latent Btu	/h	Rem	narks
		,								
Equipme	nt Heat Ga	iin								
	ensible		Q Latent					Dama adva		
	Stu/h		Btu/h					Remarks		
	512			From E	quipment H	eat G	ain List, Ass	sumption 3.1.4		
Infiltration	n	I								
	Airflow cfm						Remark	S		
Notes/Re								· · · · · · · · · · · · · · · · · · ·		,
Notes/Rei	marks									
								•		-
				•						

				ROO	M LOAE) INFORM	ATIO	N SHEET				
Room Nu	mber and	Name: 20	002F Corrido						***		THE S. J. J. J.	
											Remarks	
Room Area	a (sf)	650	Rm. Height	(ft)	14							
Indoor Des	ign Condi	tions	Summer DI	3, °F	82	Relative I	Humid	dity	Not C	ontrolled		
			Winter DB,		65	Ventilatio	n Coi	nfinement (Classificatio	n	Tertiary	
External 0	Conductio	nn			•							
<u> </u>	Height	Width	Orien-		U	Area	,	Wall		T		
Item	ft	ft	tation	Bt	u/h-ft² F	ft²		Group	Color		Remarks	
Roof												
Wall	14	9	NE		0.22	130		В		Wall 1, 4	l'concrete	
Wall												
Wall												
Wall												
Floor				ļ				100		17 18		
Internal C	<u>onducti</u> oı	n										
	it	em		Bt	U u/h-ft² F	Area ft ²	ΔT F			Remarks		
SE Partition	n and Cei	ling (summ	ner) .		0.3	1660)	8	Partition 2, Gypsum Bo		oard.	
NW Partiti	ons (sumn	ner)			0.2	1010)	8	Partition 1,	4' Concret	B	
Partition (v	vinter)								No heat los	s through p	partition.	
Floor (sum	oor (summer)				0.39	650		8	Concrete F	loor (2nd F	or (2nd Floor): 1'- 6" Thick	
Lights											· .	
					Ballast	Tota		,,,				
Тур		W/	sq. ft.	ļ f	actor	Watts				Remarks		
Fluores	cent		2		1.2	1560)	See assum	ption 3.1.2			
				l								
People										••••		
٨	ativita e Treas	_	No. of		Q Sensib		Qι	_atent Btu/l	າ ່	Π-		
AC	ctivity Type	3	People	-	Ea	1.	 	Ea.		Re	marks	
				+			-			· · ·		
Fander	4144-6	.1	<u> </u>					in the second se	1			
Equipmen	it Heat Ga ensible	un	01-44			-						
	ensible itu/h		Q Latent Btu/h					F	Remarks		,	
	102			Fr	om Equi	pment Hea	at Gai		umption 3.1	.4		
						•			<u> </u>			
Infiltration												
	irflow cfm		<u> </u>					Remarks				
	340		See Assum	notion	3.1.8. Inf	filtration air	flow i			ascaded fro	m C1 Room 2008	
	· -		220.20011	٠,٠٠٠					05 0mm 00		0	
					* *							
Notes/Rer	narks								*			
	-			•			٠					
								r				
											•	

				D00	M 1 0 1 -	INFORT	TIC:-	011555			· · · · · · · · · · · · · · · · · · ·
Poom Nu	mbor and	Nama: 20	002G Corrido		M LOAD	INFORM	AHON	SHEET			***************************************
Koom Nu	mber and	Name: 20	JUZG COMIGO								Remarks
Room Are	a (ef)	180	Rm. Height	(ft)	14						Remarks
Indoor Des			Summer DB		82	Relative H	lumidit	hv	Not Con	trolled	
	,,g., 00u.,		Winter DB,		65				Classification	itioned	Tertiary
F. 4	01 41 -		Winter DD,	,	1 00	Ventuation	1 00111	mement	Olassinoation		Tornary
External	Conductio		Orien		1.1					1	
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²		Wall Group	Color		Remarks
Roof			1124								
Wall		-									
Wall											
Wall											
Wall											
Floor	27.18	3.10 (8)					27) fi 🖭			
Internal C	onduction	n									
	It	em		Bt	U u/h-ft² F	Area ft ²		ΔT F	·K	Rem	arks
Ceiling an	d Partitions	s (summer)		0.3	580		8	Partition 2, G	Sypsum E	Board
NW Partiti	on (summ	er)			0.2	270		8	Partition 1, 4	' Concret	te
Partition (winter)		*						No heat loss	through	partition.
Ceiling									***		
Lights											-
-					Ballast	Total			_		
Tyr		VV/	sq. ft.	<u> </u>	actor	Watts	-			emarks	 .
Fluore	scent		2		1.2	432	5	ee Assur	nption 3.1.2		
5	, ,						[
People			No of		O Canaih	Ja Dhu/b	01-	Anna Davi	<u>.</u>		
Α	ctivity Type	. ·	No. of People	` `	Q Sensib Ea		Q La	tent Btu/ Ea.	n	Re	marks
Equipme	nt Heat Ga	in									
QS	ensible		Q Latent								
	3tu/h		Btu/h				-		Remarks		
	102			Fr	om Equi	pment Hea	t Gain	List, Ass	sumption 3.1.4		
				-							
Infiltratio			I					<u> </u>			
	Airflow cfm						-	Remarks	<u>S</u>		
A1.4 . (7)						<u> </u>					
Notes/Re	тагкѕ										
								٠,			

						D INFORMA				·	
Room Nu	ımber and	Name: 20	03 HVAC Ro	om Nor	th (Pro	ocess Area	Supp	ıly)			
								······································	······		Remarks
Room Are	a (sf)	4840	Rm. Height	(ft)	32						
Indoor De	sign Condi	tions	Summer DE	8, °F	90	Relative F	lumic	lity	Not Cont	rolled	
			Winter DB,	°F	65	Ventilation	n Cor	finement	Classification		Tertiary
External	Conductio	on	•								
	Height	Width	Orien-	· U		Area		Wall			
Item	ft	ft	tation	Btu/h-		ft ²		Group	Color		Remarks
Roof		1 1 1		0.0	31	4840				Roof	1, 1'-6' concrete
Wall	32	59	NE	0.2	22	1760 ¹		В		Wall	1, 4' Concrete
Wall											
Wall											
Wall											
Floor		1. 1					3		建 14 美美的		
Internal (Conduction	n .									
				U]	Area		ΔΤ			
		em		Btu/h-		ft ²		F.		Rem	narks
Partition (summer)					ļ			No heat gain t	hrough	partition.
Partition (winter)					<u> </u>			No heat loss t	hrough	partition.
Ceiling											
Lights											
				Ball	ast	Total					
Ту			q. ft.	Fac	tor	Watts	\perp			marks	
High	Bay		2	1		9680	!	See Assur	mption 3.1.2		·
						1					
People											
			No. of	Q:		ble Btu/h	QL	atent Btu/	/h		
	ctivity Type	e	People	-	E	a.	<u> </u>	Ea.		Re	marks
				:			L				
	nt Heat Ga	ain		,							
	Sensible		Q Latent						. .	•	•
	Btu/h		Btu/h	+-					Remarks		
1	5,916			Fror	n ⊨qu	ipment Hea	t Gai	n List, Ass	sumption 3.1.4		•
				+							
										•	
Infiltratio											
	Airflow cfm					-		Remark	S		
	150	,	See Assum	ption 3.	1.8		•				<u></u>
Notes/Re	marks										
1. Minus t	he exterior	area of the	adjacent co	rridor 20	02A	(130 sq. ft.)					
								•			

	-						ON SHEET	,		
Room Nu	ımber and	Name: 20	004 HVAC Roo	om North	(Process Ar	ea Su	ipply)			
										Remarks
Room Are	a (sf)	3170	Rm. Height (ft) 3:	2					
Indoor De	sign Condit	tions	Summer DB	°F 90	0 Relativ	e Hur	nidity	Not Contr	olled	
			Winter DB, °		5 Ventila	tion C	onfinement	Classification		Tertiary
Eutomol	Canduatia	_	,		I					1
External	Conductio		Ta: T				1 ,,,			
Item	Height ft	Width ft	Orien- tation	U Btu/h-ft	² F f	ea t²	Wall Group	Color		Remarks
Roof	7,14	100		0.031	1 31	70				1, 1'-6' Concrete
Wall .	32	39	NE	0.22	12	50	В		Wall 1	I, 4' Concrete
Wall										T-1000
Wall										
Wall										
Floor		9004								
Internal C	Conduction	1								
	<u>Jonaao</u> tto.	•		U	Ar	ea	ΔΤ			
	It	em		Btu/h-ft	²F Ĝ	t ²	F		Rem	arks
Partition (summer)							No heat gain the	_	
Partition (No heat loss th		
Ceiling	<u> </u>									
					<u> </u>	••••	1.			
Lights							T			
Ту	ne l	\//	sq. ft.	Ballas Facto		tal		Per	marks	
High		V V 7.	2	1	63		Soo Assur	mptions 3.1.2	Haiks	
riigii				<u>'</u>		40	See Assur	IIIDUOIIS 3. 1.2		
					1		I,			
People			,	· · · · · · · · · · · · · · · · · · ·				···		
A	ctivity Type	9	No. of People	Q Se	nsible Btu/h Ea.	- (Latent Btu/ Ea.	/h	Rei	marks
				-		-				
Equipme	nt Heat Ga	in .	I	_1			•			
	Sensible		Q Latent							
	Btu/h		Btu/h					Remarks		
	3,532			From E	Equipment H	eat C	Sain List, Ass	sumption 3.1.4		
Infiltratio	n			•			,		**	
	Airflow cfm						Domode	c		
	110		See Assump	tion 2 4 9			Remark	3		
 	110		See Assump	niOH 3.1.8						
			l							
•• • :=										
Notes/Re	marks							1		•
										•

				ROO	M LOAD	INFORMA	TION SHE	EET			
Room N	umber and	Name: 20	005 Instrumer	nt and	Electrica	l Shop					
			<u> </u>								Remarks
Room Are		4290	Rm. Height		32						
Indoor De	sign Condi	tions	Summer DE		90	Relative H			_	ntrolled	
			Winter DB, 9	°F	65	Ventilation	Confinem	nent C	lassification	1	Tertiary
External	Conduction	n									
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	Wal Grou		Color		Remarks
Roof	2.34				0.031	4290		i i		Roof 1,	1'-6" concrete
Wall	32	52	NE		0.22	1660	В			Wall 1, 4	l' concrete
Wall	28	74	SE	•	0.22	2070	В			Wall 1, 4	l' concrete
Wall	<u> </u>										
Wall		The section of the se									
Floor	1.00							1 5	1411		
Internal	Conduction	n									
	it	em .		Bt	U u/h-ft² F	Area ft ²	ΔT F			Rem	arks
Partition	(summer)							1	No heat gai	n through	partition.
Partition	(winter)								No heat los	s through	partition.
Ceiling											
Lights											
Τv	pe		sq. ft.		Ballast Factor	Total Watts			1	Remarks	
	Bay		2	<u>'</u>	1	8580	See A	ssumi	ption 3.1.2	CHIGHS	***************************************
People											
			No. of	-	Q Sensib		Q Latent				
<i>F</i>	Activity Type	9	People	_	Ea		Ea.			Rei	marks
				_							
							· · · · · · · · · · · · · · · · · · ·	·			
	nt Heat Ga	in ,									
	Sensible		Q Latent					Б.			
	Btu/h 341		Btu/h	-	om Fari	omont Host	Cain List		emarks		
	J4 I			-	om =qui	pment Heat	Gain List,	, ASSU	inpuon 3.1.	4	
		- 									
Infiltratio	n										
	Airflow cfm						Ren	narks			
-	240		See Assum	ption	3.1.8		, ,511				
				···			·				
Notes/Re	marks				.,						
						•					
				•							
					•						
										•	

Room Area (sf) 3180 Rm. Height (ft) 32					ROO	M LOAE	INFORMA	ATIC	N SHEET				Translation .
Room Area (sf) 3180 Rm. Height (ft) 32 Summer DB, °F 90 Relative Humidity Not Controlled	Room Nu	mber and	Name: 20	06 HVAC Ro	om (F	HEPA Ex	haust for S	upp	ort, Decon	and L	LW Are	eas)	
Note			~~~	· · ·									Remarks
Winter DB, °F 65 Ventilation Confinement Classification Tertiary				Rm. Height	(ft)	32	r						
Height Height Height Width Orientation Btu/h-ft² F Area Wall Group Color Remarks	Indoor Des	sign Condi	tions	Summer DB	, °F	90	Relative F	lumi	idity		Not Co	ontrolled	
Item				Winter DB, ^c	°F	65	Ventilation	n Co	nfinement	Class	ification	1	Tertiary
Item	External (Conductio	n										
Roof	Item				Rti		Area			_	olor		Pomarke
Wall 32 43 NE 0.22 1380 B Wall 1, 4' concrete Wall 32 74 NW 0.37 2370 B Wall 3, 2' concrete Wall Wall 3, 2' concrete Wall 3, 2' concrete Wall Wall 3, 2' concrete Wall Area ΔT F Item Btu/h-ft² F ft² F Remarks Partition (summer) No heat gain through partition. Partition (winter) No heat loss through partition. Celling No heat loss through partition. Lights Remarks Type W/sq. ft. Factor Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type People Q Sensible Btu/h Ea. Remarks Equipment Heat Gain Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Remarks												Roof 1 1	
Wall 32		32							R			1	
Wall Wall Floor Wall W		1						-					
Wall Floor Internal Conduction Item				1		0.01	20,0					vvan o, z	Concrete
Floor Internal Conduction Item Btu/h-ft² F ft² F Remarks Partition (summer) Partition (winter) Ceiling Lights Type W/sq. ft. Ballast Factor Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type No. of People Ea. Remarks Equipment Heat Gain Q Sensible Btu/h Btu/h Btu/h Btu/h From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks				1				1					
Internal Conduction Item			0.4.40	* 1							8 5 5		
Item		`aadı.a4!=	ALIE SA CITYMINE						BEATT OF THE TOTAL			1	
Item Btu/h-ft² F ft² F Remarks	mternai C	onduction					A :	Т	^-				
Partition (summer) Partition (winter) Ceiling Lights Type W/sq. ft. Ballast Factor Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type People Ea. Remarks Equipment Heat Gain Q Sensible Btu/h		it	em		Btı		Area ft ²					Rem	arks
Partition (winter) Ceiling Lights Type W/sq. ft. Factor Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type People Ea. Remarks Equipment Heat Gain Q Sensible Btu/h Btu/h Btu/h Btu/h Btu/h Remarks From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm No heat loss through partition. Remarks Remarks Remarks Remarks From Equipment Heat Gain List, Assumption 3.1.4	Partition (1		No I	neat dai		
Ceiling Lights Type W/sq. ft. Ballast Factor Watts Total Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type No. of People Q Sensible Btu/h Ea. Q Latent Btu/h Ea. Remarks Equipment Heat Gain Btu/h Btu/h Q Latent Btu/h Remarks From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Remarks								\neg					
Type W/sq. ft. Factor Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type No. of People Ea. Remarks Equipment Heat Gain Q Sensible Btu/h Btu/h Btu/h Btu/h Btu/h Btu/h Btu/h Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks								\neg					
Type W/sq. ft. Factor Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type No. of People Ea. Remarks Equipment Heat Gain Q Sensible Btu/h Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks				·						·			
Type W/sq. ft. Factor Watts Remarks High Bay 2 1 6360 See assumption 3.1.2 People Activity Type No. of People Q Sensible Btu/h Ea. Q Latent Btu/h Ea. Remarks Equipment Heat Gain Btu/h Q Latent Btu/h Btu/h Remarks Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks	Ligitis					Pallact	Total	T					 -
People Activity Type No. of People Equipment Heat Gain Q Sensible Btu/h Btu/h Btu/h Btu/h Airflow cfm Q Sensible Remarks	Тур	oe .	W/s	sq. ft.								Remarks	
People Activity Type No. of People Equipment Heat Gain Q Sensible Btu/h Ea. Q Sensible Btu/h Remarks 53,784 Infiltration Airflow cfm Remarks People Q Sensible Btu/h Remarks From Equipment Heat Gain List, Assumption 3.1.4								-+	See assur	nptior			
Activity Type No. of People People									-		***********		
Activity Type No. of People Q Sensible Btu/h Ea. Remarks	People												
Activity Type People Ea. Ea. Remarks Equipment Heat Gain Q Sensible Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks	. сор.с			No. of	Τ.	O Sensih	le Btu/b	0	Latent Btu/	'n			
Q Sensible Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks	A	ctivity Type	Э									Rei	marks
Q Sensible Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks													
Q Sensible Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks											•		
Q Sensible Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Airflow cfm Remarks	Equipme	nt Heat Ga	in										
Btu/h Btu/h Remarks 53,784 From Equipment Heat Gain List, Assumption 3.1.4 Infiltration Remarks				Q Latent									
Infiltration Airflow cfm Remarks					\perp				ļ	Rema	rks		
Airflow cfm Remarks	, 5	3,784			Fr	om Equi	pment Hea	t Ga	in List, Ass	sumpt	ion 3.1.	4	
Airflow cfm Remarks					4_								
Airflow cfm Remarks		-											
	Infiltratio	n											
		Airflow cfm							Remark	s			
		510		See Assum	ption	3.1.8							

Room Nu	mber and	Name: 20	07 Canister	Trans	fer Room	1					
				A-A-						······································	Remarks
Room Area	a (sf)	7770	Rm. Height	(ft)	68						
ndoor Des	ign Condi	tions	Summer DE	s, °F	79	Relative H	lun	nidity	Not	Controlled	
			Winter DB,	°F	65	Ventilation	n C	onfinement	Classificat	ion	Tertiary
External (Conductio	on									
Item	Height ft	Width	Orien- tation	Bt	U u/h-ft² F	Area ft ²		Wall Group	Color		Remarks
Roof			NA ENGLIS		0.031	7770					1, 1'-6" Concrete
Wall	36	105	NE		0.22	3780		В		Wall	1, 4' concrete
Wall	36	105	SW		0.22	3320	1	В		Wall	1, 4' concrete
Wall	36	74	NW		0.22	2660		В		Wall	1, 4' concrete
Wall	28	74	SE		0.22	2070		В		Wall	1, 4' concrete
Floor			10000						4961		
Internal C	<u>onducti</u> oı	n									
	It	em		Bt	U u/h-ft² F	Area ft ²		ΔT F		Rem	narks
Partitions	Next to Co	orridors (sur	nmer)		0.2	2300		3	Partition	1, 4' Concre	te
Large Sec	ond Floor	Partitions (summer)		0.2	6790		11	Partition 1, 4' Concr		te
Floor (sum	mer)				0.39	4200		21	Concrete	Floor (2nd I	loor): 1'- 6" Thick
Floor (sum	mer)				0.39	3570		11	Concrete	Floor (2nd F	loor): 1'- 6" Thick
Partition (v	vinter)		.,						No heat I	oss through	partition.
Lights										•	•
Тур	Type W/sq. ft.				Ballast Factor	Total Watts				Remarks	
High	Вау		2 .		1	15540)	See Assur	nption 3.1	.2	· · · · · · · · · · · · · · · · · · ·
People											
A	ctivity Type	e	No. of People		Q Sensib Ea		С	Latent Btu/ Ea.	h	Re	marks
				-			_				
Equipmer	nt Heat Ga	in						<u> </u>			
QS	ensible		Q Latent								
	tu/h		Btu/h	-					Remarks		
25	0,687			Fr	om Equi	pment Hea	t G	ain List, Ass	sumption 3	.1.4	
Infiltration		Т									
	irflow cfm		0 4 :		0.4.0			Remark	s	× +0	
	100		See Assum	ption	<u> </u>						
											• • • • • • • • • • • • • • • • • • • •
Notes/Rer	narks										

	unu		09 HVAC Ro	J O		2300 Filda		·PP'J/			Remarks
Room Area	a (sf)	3770	Rm. Height	 (ft)	32						Remarks
ndoor Des			Summer DB		90	Relative H	lum	nidity	Not C	Controlled	,
	ngii oonan		Winter DB,		65			onfinement (Tertiary
			Willier DD,			Vertilation		Ommement	Jiassincatic	///	Terdary
External C	r		10:			1 .	1		····		
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²		Wall Group	Color		Remarks
Roof	1141204				0.031	3490 ¹				Roof 1,	1'-6" concrete
Wall	32	46	SW		0.22	1470		В			1' Concrete
Wall	32	57	NW		0.22	1820		В		1	1' Concrete
Wall											
Wall											
Floor	4.								表表示意		
Internal C	onductio	<u> </u>									
				•	U	Area		ΔΤ			
		em		Btı	u/h-ft² F	ft ²	+	F		Rem	
Partition (s							-			ain through	
Partition (v	vinter)					-	-		No heat lo	ss through	partition.
Ceiling							1	1			
Lights			· · · · · · · · · · · · · · · · · · ·				_	,			
Тур		\٨//ه	sq. ft.		Ballast Factor	Total Watts				Remarks	
High I			2	<u>-</u>	1	7540	1	See Assum	ption 3.1.2		
			-			1 1 2 1 2	7		<u> </u>		
People											
. 000.0			No. of	T (Q Sensibl	e Btu/h	G	Latent Btu/l	<u>, </u>		
Ad	ctivity Type	9	People	``	Ea			Ea.	-	Re	marks
				1_							
		·		L							
Equipmen	t Heat Ga	in									
	ensible		Q Latent					_			
	ttu/h		Btu/h	+-					Remarks		
0	,175		***	Fr	om Equip	ment Hea	I G	ain List, Ass	umption 3.	1.4	
						·····			•		
Indilan-41											
Infiltration ^								D			
A	irflow cfm		Soo Assure	ntion '	2 1 0			Remarks	3		
	190	i	See Assum	ption	ა. 1.8						
									•		
	narks										

			4.5.5.7.7.7.7				TION SHEET			
Room Nu	mber and	Name: 20	10 HVAC Ro	om S	outh (Pro	ocess Area	Supply)		***********	T
		1010		4515	1 00			1		Remarks
Room Are		4840	Rm. Height		32					
Indoor De	sign Condit	ions	Summer DB		90	Relative H	· · · · · · · · · · · · · · · · · · ·	Not Co		
			Winter DB, o	°F	65	Ventilation	Confinement	Classification		Tertiary
External	Conductio	n	····					1		
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	Wall Group	Color		Remarks
Roof	1,7 1 1	7 E E E	141.1		0.031	4840	44.44.44		Roof 1	, 1'-6" Concrete
Wall	32	59	sw		0.22	1760 ¹	В		Wall 1,	4' Concrete
Wall										
Wall										
Wall										
Floor	30.5									
Internal (Conduction	1								
	. Ite	em		Bt	U u/h-ft² F	Area ft ²	ΔT F		Rem	arks
Partition (No heat gair	n through	partition.
Partition (winter)							No heat loss	through	partition.
Ceiling										
Lights										
Tv	Type W/sq. ft.				Ballast Factor	Total Watts		F	Remarks	
High			2		1	9680	See Assu	mption 3.1.2		
People										
			No. of		Q Sensib	le Btu/h	Q Latent Btu	ı/h	-	
	ctivity Type	•	People	+-	Ea	1.	Ea.		Re	marks
				_					***************************************	
		l		L						
	nt Heat Ga Sensible		O Latant							
	sensible 3tu/h		Q Latent Btu/h					Remarks		
	2,472		W -	Fi	rom Equi	pment Heat	Gain List, As	sumption 3.1.4	ļ	
							,			
In6144'-						*.*				
Infiltratio	n Airflow cfm						Remark	/c		
•	150		See Assum	ntion	3 1 8		reman			· · · · · · · · · · · · · · · · · · ·
			JUU ABBUILL	PuUIT	J. 1.U					
Notes/Re	marke									
		area of Co	rridor 2002F	(130	sa ft \		•	•		
wiii ius i	CARGIO	arca or co	20025	(130	oq. 16.)					
•										

							TION SHEET			
Room Nu	mber and	Name: 20	11 HVAC Ro	om So	outh (Pro	cess Area	Supply)			T
								1	·	Remarks
Room Are		3170 [°]	Rm. Height		32					
Indoor Des	sign Condit	ions	Summer DB		90	Relative H			ntrolled	
			Winter DB, o	F	65	Ventilation	Confinement	Classification		Tertiary
External	Conductio	n								
	Height	Width	Orien-		U	Area	Wall			
Item	ft	ft	tation		ı/h-ft² F	ft ²	Group	Color		Remarks
Roof	184.80.57				0.031	3170	LTF. 2			1'-6" concrete
Wall	32	39	SW	- 1	0.22	1250	<u>B</u>		Wall, 4'	concrete
Wall	1		_							
Wall										
Wall		To San City			*					
Floor							1,114			
Internal C	onduction	3				 				
				ъ.	U2 =	Area	ΔΤ		_	
Davida - 1		em		Bit	ı/h-ft² F	ft ²	F	A 1 - 1 1 1	Rem	
Partition (No heat gair		
Partition (winter)					- ;		No heat los:	s through	partition.
Ceiling						<u> </u>		<u> </u>		
Lights	<u> </u>		· · · · · · · · · · · · · · · · · · ·							
т		14//-	4		allast	Total		,		
	Type W/sq. ft. High Bay 2				actor 1	6340	Con coou	mption 3.1.2	Remarks	
nigii	Бау		2		·	0340	See assu	mpaon 3. 1.2		
		 				[<u> </u>	######################################		
People				· T						
Δ	ctivity Type		No. of People	c	Sensib Ea		Q Latent Btu Ea.	/h	Ro	marks
· · · · ·	cuvity Type	<u></u>	Гсоріс				<u> </u>		110	IIIaiks
									•	
Earlings	nt Hoot Co							. 1		
	nt Heat Ga Sensible		O Latant							
	ensible 3tu/h	1	Q Latent Btu/h				•	Remarks		
	6638			Fre	om Equi	pment Heat		sumption 3.1.	4	
							·			
Infiltratio	n									
	Airflow cfm	····	3 37 37 18 19				Remark			
	110		See Assum	otion 3	3.1.8		· (Orridir	: -		
			3 - 2							
							w.t*.		 	
Notes/Re	marks							•		
	-									

				ROO	M LOAD	INFORMA	NOITA	SHEET			
Room Nu	mber and	Name: 20	012 Receiver/	Dryer	Equipme	ent Room					
									•		Remarks
Room Are	a (ft)	4290	Rm. Height	(ft)	32						
Indoor Des	sign Condi	tions	Summer DB	, °F	90	Relative H	lumidity	,	Not C	ontrolled	• .
			Winter DB,		65	Ventilation	n Confir	nement	Classificatio	n	Tertiary
External	Conduction	n									
<u> </u>	Height	Width	Orien-		U	Area	Τv	Vall			
Item	ft	ft	tation	Bt	u/h-ft² F	ft ²	G	roup	Color		Remarks
Roof	7174FV			I	0.031	4290	A and	Alb		Roof 1,	1'-6" Concrete
Wall	28	52	SW		0.22	1460		В		Wall 1, 4	l" Concrete
Wall	32	72	SE		0.22	2300		В		Wall 1, 4	l" Concrete
Wall											
Wall		1 30-19-20-5							28.280-88.4-39.2		
Floor	453										10 221
Internal C	Conduction	n									
	••			ς.	U 42 F	Area		ΔΤ			
Dodition (em		Bti	u/h-ft² F	ft ²		F	Na beet	Rem	
Partition (+			ain through	
Partition (winter)	 .							ino neat lo	ss through	partition.
Ceiling											
Lights										***	
Tvr	Type W/sq. ft.				Ballast Factor	Total Watts				Remarks	
High		V V /-	2		1	8580		Δeeum	nption 3.1.2	Remarks	
	July					- 0000	- 000	, 7105uii	1011 0.1.2		
People							L				
reopie			No. of		Q Sensib	lo Rtu/h	O Lat	ent Btu/	h		
Α	ctivity Type	Э	People	`	Ea			Ea.	<u>'</u>	Re	marks
Equipme	nt Heat Ga	ıin									
	ensible		Q Latent								
	Btu/h		Btu/h	\bot		********			Remarks	-	
12	20,425	<u> </u>		Fr	om Equi	oment Hea	t Gain L	ist, Ass	umption 3.1	.4	
				_							
Infiltratio											
	Airflow cfm					•	F	Remarks	S		
	240		See Assum	ption :	3.1.8					<u></u>	
Notes/Re	marks										

				ROO	M LOAD	INFORM	ΑTI	ON SHEET			
Room Nu	nber and	Name: 20	26 Stair#41		•						
						T					Remarks
Room Area		400	Rm. Height		16						
Indoor Des	ign Condi	tions	Summer DE		102	Relative I		-	Not Controlle	ed	
			Winter DB,	°F	65	Ventilatio	n C	onfinement Cl	assification		Tertiary
External (onduction	on									
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	1	Wall Group	Color		Remarks
Roof		0.00									
Wall											
Wall											
Wall											
Wall											
Floor		1.7							7.00		
Internal C	onductio	n									
	11	tem		Bt	U u/h-ft² F	Area ft ²)	ΔT		Rem	arks
Partition (s	ummer)										
Partition (v	vinter)										
Ceiling											
Lights								1			
Тур	е	W/:	sq. ft.		Ballast Factor	Total Watts			Rema	rks	W-f-sh-sh-same
		<u> </u>								-	
People									-1		
	ali da i Ti da	_	No. of		Q Sensib		C	Latent Btu/h		_	
A0	ctivity Typ	е .	People		Ea	3.	H	Ea.		Ker	marks
		·:			•		 				
Equipmen	t Heat G	ain				•	<u> </u>		· · · · · · · · · · · · · · · · · · ·		
	ensible tu/h		Q Latent Btu/h					Re	emarks		
			Diam	+				110	·		
1611											
Infiltration						<u>.</u>		D			
A	irflow cfm	I		-				Remarks			
						•					
Notes/Ren	narko				• • • • • • • • • • • • • • • • • • • •						
		ditioned spa	ace (Assumpt	ion 3.	1.14)			•			

				ROO	M LOAD	INFORMA	ATION SI	HEET			
Room Nu	ımber and	Name: 20)29 Elevator I	obby							
						•					Remarks
Room Are	a (ft)	400	Rm. Height	(ft)	32						
Indoor De	sign Condit	tions	Summer DE	3, °F	82	Relative F	lumidity		Not Co	ontrolled	
			Winter DB,	°F	65	Ventilation	Confine	ment	Classification	1	Tertiary
External	Conductio	n									
	Height	Width	Orien-		U	Area		'all	_		
Item	ft	ft	tation	Btt	u/h-ft² F	. ft ²	1.0000	oup	· Color		Remarks
Roof			0.0			4000	10.20	· ·			
Wall	32	33	SW		0.113	1060					Metal Wall
Wall	32	9	NW		0.113	290		3		Wall 2. N	Metal Wall
Wall	 										
Wall	10,020,125,24	2.04				· ·					
Floor	L: 《 ·特代》	10						9.43		L	
Internal (Conduction	<u> </u>	` 1			·					
	Ita	em		Btı	U u/h-ft² F	Area ft ²		T		Rem	arks
NE and S	E Partitions	s (summer)		0.2	1220	1	3	Partition 1,	4' Concrete	9
NW Partit	ion (summ	er)			0.3	480		3	Partition 2,	Gypsum B	oard
Partition (winter)]	No heat los	s through p	partition.
Lights											
				Е	Ballast	Total					
Ту	Type W/sq. ft.				actor	Watts				Remarks	
Fluore	scent		2		1.2	960	See	Assur	mption 3.1.2		
				:							
People											
			No. of	(Q Sensib	le Btu/h	Q Later	nt Btu/	'n		
Α	ctivity Type	9	People		Ea	1. '	E	a		Re	marks
								•			
	nt Heat Ga	in									
	Sensible		Q Latent					_			
	Btu/h		Btu/h	+_					Remarks		
	102			Fr	om Equi	pment Hea	t Gain Lis	st, Ass	sumption 3.1	.4	
			•								
		<u> </u>					· · ·				
Infiltratio											
	Airflow cfm						Re	emark	s		
	1170		See Assum	ption	3.1.8				•		
								•			
Notes/Re	marks										
Notes/Re	marks										
Notes/Re	marks										

mber and					THE CITALITY	111	ON SHEET			
	Name: 30	01 Corridor								
				· · · · · · · · · · · · · · · · · · ·						Remarks
a (sf)	280	Rm. Height		14			· · · · · · · · · · · · · · · · · · ·			
ign Condit	tions			1						
	,,	Winter DB, 9	°F	65	Ventilation	1 Co	onfinement	Classificati	on	Tertiary
Conductio	n									
Height ft	Width ft	Orien- tation	Btı	U u/h-ft² F	Area ft ²		Wall Group	Color		Remarks
	- 11 PAS		(0.065	280				Roof 2,	Metal Roofing
14	21	sw	(0.113	290		G		Wall 2. I	Metal Wall
14	14	SE	(0.113	200		G		Wall 2. I	Metal Wall
					-					
		V b/A hares below has over					Colonia de la co	annen og der se		
	* 177.7	1.000					11000	\$45 E S	# 2	
onduction	1	-								
Ite	em		Btu	U u/h-ft² F	Area ft ²		ΔT F		Rem	arks
mer)				0.39	. 280		8			ioor): 1'- 6" Thick
vinter)								No heat lo	ss through p	partition.
ights Type W/sq. ft.					1				Remarks	
scent		2		1.2	672		See Assu	nption 3.1.	2	
ctivity Type)	No. of People	C			Q	Latent Btu/ Ea.	'h	Re	marks
		-								
nt Heat Ga	in		,							
ensible Itu/h		Q Latent Btu/h		,				Remarks		
								•		· · · · · · · · · · · · · · · · · · ·
					· · · · · · · · · · · · · · · · · · ·					
1	1		•						E-F	
		· · · · · · · · · · · · · · · · · · ·	-4' -	24.2			Remark	S		
210		See Assum	ption 3	3.1.8						
										· · · · · · · · · · · · · · · · · · ·
пагкѕ				,						
,										
	onduction Height ft 14 14 14 onduction Items conduction Height ft Width ft 14 21 14 14 14 14 14 14 14 14 14 14 14 14 14	ign Conditions Summer DB Winter DB, G Conduction Height fit Orientation 14 21 SW 14 14 SE onduction Item Immer) Vinter) W/sq. ft. Scent 2 Cotivity Type No. of People At Heat Gain Ensible At Least Btu/h Indicate Conduction At Grand Conduction Summer DB Winter DB Winter DB	Summer DB, °F Winter DB, °F Winter DB, °F Conduction Height Width Orientation Bti 14 21 SW 0 14 14 SE 0 14 SE 0 14 SE 0 15 Scent Scen	Summer DB, °F 82 Winter DB, °F 65 Conduction Height Width Orientation Btu/h-ft² F 0.065 14 21 SW 0.113 14 14 SE 0.113 conduction Item Btu/h-ft² F mer) 0.39 winter) Ballast Factor Scent 2 1.2 W/sq. ft. Factor People Each Scent 2 1.2 Conduction Calculate A Scent Calculate	Summer DB, °F 82 Relative F Winter DB, °F 65 Ventilation Conduction Height fit fit tation Btu/h-ft² F ft² 0.065 280 14 21 SW 0.113 290 14 14 SE 0.113 200 Item Btu/h-ft² F ft² 0.39 280 onduction Item Btu/h-ft² F ft² Area ft² mer) 0.39 280 winter) No. of People People People Ea. Strivity Type People Q Sensible Btu/h Ea. It Heat Gain ensible tu/h Btu/h in Inflow cfm 210 See Assumption 3.1.8	Summer DB, °F 82 Relative Hum Winter DB, °F 65 Ventilation Conduction Height Width ft tation Btu/h-ft² F ft² 0.065 280 14 21 SW 0.113 290 14 14 SE 0.113 200 Item Btu/h-ft² F ft² 0.39 280 onduction Item Btu/h-ft² F ft² amer) 0.39 280 winter) W/sq. ft. Ballast Factor Watts scent 2 1.2 672 Stivity Type People Fa. at Heat Gain ensible Character Btu/h Btu/h See Assumption 3.1.8	Summer DB, °F 82 Relative Humidity	Summer DB, °F 82 Relative Humidity Not of Winter DB, °F 65 Ventilation Confinement Classification Conduction Height Midth Orientation Btu/h-ft² F ft² Group Color 0.065 280 14 21 SW 0.113 290 G 14 14 SE 0.113 200 G 14 14 SE 0.113 200 G 15 14 14 SE 0.113 200 G 16 15 16 16 16 16 16 16 16 16 16 16 16 16 16	Summer DB, °F 82 Relative Humidity Not Controlled Winter DB, °F 65 Ventilation Confinement Classification	

				ROO	M LOAD	INFORM	ΑTΙ	ON SHEET			
Room Nu	mber and	l Name : 30	26 Stair #41								
					T		_				Remarks
Room Area		400	Rm. Height		16		_				
Indoor Des	sign Cond	itions	Summer DE		102	Relative F			Not Con	trolled	
			Winter DB,	<u>'F</u>	65	Ventilatio	n C	Confinement C	Jassification		Tertiary
External (1		r 				Т			
Item	Height ft	Width ft	Orien- tation	Bti	U u/h-ft² F	Area ft ²		Wall Group	Color		Remarks
Roof	-		7 9 5	<u> </u>				10条号			
Wall			_	<u> </u>							
Wall	ļ										
Wall	<u> </u>			<u> </u>							
Wall								3 46 605			
Floor Internal C	Terror services										, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
	ł	tem		Btı	U u/h-ft² F	Area ft ²	1	ΔT	,,,	Rem	arks
Partition (s	summer)					`					
Partition (v	winter)										
Ceiling				L							
Lights		1						·····			
Тур	oe	W/s	sq. ft.		Ballast Factor	Total Watts			R	emarks	
					, ·			<u> </u>			
People		· · · · · · · · · · · · · · · · · · ·	No. of	Τ,	0.0	I- D4 //b	_	N - 4 - 4 D4 (6			
A	ctivity Typ	e	No. of People	'	Q Sensib Ea		, c) Latent Btu/h Ea.	'	Rei	marks
Equipmer	nt Heat G	ain									
	ensible 8tu/h		Q Latent Btu/h					R	emarks		
		<u>'</u>		\perp							
,											
		:									
Infiltration	า										
	Airflow cfm	<u> </u>						Remarks			
			724								
Notes/Rer	marks					, ,					
1. This is a	a non-con	ditioned spa	ace (Assumpt	ion 3.	1.14)			•			
											,
i											

				ROC	M LOAD	INFORMA	TION	SHEET			
Room Nu	mber and	Name: 30	29 Elevator I	obby	•						T
Doom Are	n (nf)	660	Des Heimht	/#\	12						Remarks
Room Are	a (si) sign Condit		Rm. Height Summer DE		82	Relative H	lumidi	tv	Not C	ontrolled	
indoor De	sign Condi	lions	Winter DB,		65				Classification		Tertiary
			winter DB,	<u> </u>	1 00	Vermanon	COIII	mement	Ciassilication		Teruary
External	Conductio		10:					147 11		T	
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²		Wall Group	Color		Remarks
Roof	100	riga					2.87	44.	•		
Wall	12	33	SW		0.113	400 G			Wal		Metal Wall
Wall	12	9	NW		0.113	110		G		Wall 2. Metal Wall	
Wall	12	10	SE	-	0.113	120		G		Wall 2. Metal Wall	
Wall	12	24	NE		0.113	290		G		Wall 2. I	Metal Wall
Floor							ide	WK I			
Internal (Conduction	n ·						-		· · · · · · · · · · · · · · · · · · ·	
	It	em		Bt	U u/h-ft² F	Area ft ²		ΔT F		Rem	narks
NW Partit	ion (summ	er)			0.3	180		8	Partition 2,	Gypsum B	oard
Partition (winter)								No heat los		
Ceiling (s	ummer)				0.113	660		8	Wail 2. Meta	al Wall	
Lights									-		
Ту	ne	W/:	sq. ft.		Ballast Factor	Total Watts				Remarks	
Fluore			2		1.2	1584		ee Assur	nption 3.1.2	romano	
	,										
People											
,			No. of		Q Sensib	le Btu/h	Q La	tent Btu/	h		
Α	ctivity Type		People	_	Ea	3.		Ea.		Re	marks
				_							
Equipme	nt Heat Ga	in									
	Sensible Btu/h		Q Latent						Jaman'	•	
	DIU/N		Btu/h	+					Remarks		
				+							
				+							· · · · · · · · · · · · · · · · · · ·
Infilerati-			•								
Infiltratio								Dom:-J			
<u>.:</u>	Airflow cfm 1110		See Assum	ntics	210			Remark	>		
	1110		See Assum	Puon	J. 1.0			· · · · · · · · · · · · · · · · · · ·			
	-										
Notes/Re	marks										
			•								
	•										

		101				INFORMA	TION	SHEET			
Room Nu	mber and	Name: R0	01 Firefight E	Elevat	or Mach	ine Room					·
											Remarks
Room Are		940	Rm. Height		14						
Indoor De	sign Condit	ions	Summer DB		90	Relative F				ontrolled	
			Winter DB, o	'F	65	Ventilation	Confir	nement	Classificatio	n	Tertiary
External	Conductio	n									
Item	Height ft	Width ft	Orien- tation	Btu	U µ/h-ft² F	Area ft ²	G	Wall Group	Color		Remarks
Roof		204	1 2 2 2 2	C	0.065	940	3	165		Roof 2,	Metal Roofing
Wall	14	43	NE		0.113	600		G		Wall 2. M	Metal Wall
Wall	14	24	SE		0.113	340		G		Wall 2. N	Metal Wall
Wall	14	33	SW		0.113	460		G		Wall 2. M	Metal Wall
Wall	14	24	NW	C	0.113	340		G		Wall 2. N	Metal Wall
Floor	3 10	g la fizia					400	Grade sign	THAL		
Internal C	Conduction	1									
	Ite	em		Btu	U ı/h-ft² F	Area ft ²		ΔT F		Rem	arks
Partition (summer)					_			No heat ga	in through	partition.
Partition (winter)				•				No heat los	ss through	partition.
Ceiling											
Lights											
Ту	Type W/sq. ft.		q. ft.		Ballast Total Factor Watts			Remarks			
Fluore	scent		2		1.2	2256	Se	See Assumption 3.1.2			
People							<u> </u>				
			No. of					Q Latent Btu/h			
A	ctivity Type)	People	Ea.			Ea.		Re	marks	
						-					
QS	nt Heat Ga Sensible		Q Latent	<u> </u>		.					
	Stu/h		Btu/h	+-					Remarks		
;	3412		*	Se	e Assun	nption 3.1.1	8				
		_		+							
							•				
	•						·····				
Infiltratio		r		•						•	
	Airflow cfm						F	Remark	s		
											<u>.</u>
	·										
Notes/Re	marks										
						*					

				ROC	M LOAD	INFORM	ΑTI	ON SHEET			
Room Nur	mber and	Name: RO	26 Firefight	Eleva	tor Machi	ine Stair ¹					1
	······································				7						Remarks
Room Area		400	Rm. Height		26					***	
Indoor Des	ign Condi	itions	Summer DE		102	Relative I			Not Con	trolled	
Winter DB,		°F	65	Ventilatio	n C	Confinement C	lassification	*****	Tertiary		
External C	onduction	on	V								
Item	Height ft	Width ft	Orien- tation	Bt	U u/h-ft² F	Area ft ²	1	Wall Group	Color		Remarks
Roof											
Wall											
Wall											
Wall											
Wall											
Floor		14454	7.45								
Internal C	onductio	n									
	li	tem		Bt	U u/h-ft² F	Area ft ²	1	ΔT	.,	Rem	arks
Partition (s	ummer)										
Partition (w	vinter)										
Ceiling											
Lights								1			7544
Тур	е	W/s	sq. ft.		Ballast Factor		Total Watts Remarks				
									7744		
People	· · · · ·										7,7,2,1
			No. of	7	Q Sensib	ole Btu/h Q Latent Btu/h					
Ac	tivity Typ	e	People		Ea		Ea. Remarks		narks		
					•						
Equipmen	t Heat Ga	ain									
	ensible		Q Latent								
В	tu/h		Btu/h			Remarks					
										.	
Infiltration		l . <u></u>									
	irflow cfm	ı						Remarks			
											•
Notes/Ren	Notes/Remarks										
1. This is a	1. This is a non-conditioned space (Assumption 3.1.14)										
						•					
								,			

Calculation of U-Values

Roof Assembly U-Value

The elements of construction come from the General Arrangement Drawings (Assumption 3.1.1). Values of resistance come from ASHRAE Fundamentals (Reference 2.2.4, Chapter 25). Where a range of resistance is given, the average resistance value is used in this calculation. The concrete density of 150 pounds per cubic foot comes from Section 4.2.11.6.6 of the Project Design Criteria Document (Reference 2.2.1). Roof deck thickness comes from Assumption 3.1.1.

Table A-1. Roof Type 12: 1'-6" Thick Concrete, with R-30 Insulation

Element	Reference	Resistance, R ft2-°F-h/Btu
Moving Air, Any Position. At 7.5 mph wind – Summer (Assumption 3.2.2)	ASHRAE Fundamentals 2005, Table 1, p25.2	0.25
R-30 Insulation		30.00
Concrete 18" thick at density of 150 lb/ft3	ASHRAE Fundamentals 2005, Table 4, p25.8	1.35
Still Air, Horizontal-Downward Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.92
	Total Resistance, R _T =	32.52
	U-Factor = 1/R _T , Btu/h-ft²-°F	0.031

Table A-2. Roof Type 1: Metal Roofing

Element	Reference	Resistance, R ft²-°F-h/Btu						
	See Assumption 3.1.9							
<u> </u>	U-Factor = Btu/h-ft²-°F	0.065						

Wall Assembly U-Value

The elements of construction come from the General Arrangement Drawings (Assumption 3.1.1). Values of resistance come from ASHRAE Fundamentals (Reference 2.2.4, Chapter 25) and ASHRAE Std. 90.1-2004 (Reference 2.2.6, Table A9.2B). The concrete density of 150 pounds per cubic foot comes from Section 4.2.11.6.6 of the Project Design Criteria Document (Reference 2.2.1).

Table A-3. Wall No. 1: 4'-0" Thick Concrete, no insulation

Element	Reference	Resistance, R ft²-°F-h/Btu
Moving Air, Any Position. At 7.5 mph wind Summer (Assumption 3.2.2)	ASHRAE Fundamentals 2005, Table 1, p25.2	0.25
Concrete 48" thick at density of 150 lb/ft ³ (Reference 2.2.1, Section 4.2.11.6.6)	ASHRAE Fundamentals 2005, Table 4, p25.8	3.60
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
	Total Resistance, R _T =	4.53
	U-Value = 1/R _T , Btu/h-ft²-°F	0.22

Table A-4. Wall No. 2: Metal Wall

Element	Reference	Resistance, R ft²-ºF-h/Btu
	See Assumption 3.1.9	
	U-Value = Btu/h-ft²-°F	0.113

Table A-5. Wall No. 3: 2'-0" Thick Concrete, no insulation

Element	Reference	Resistance, R ft²-°F-h/Btu
Moving Air, Any Position. At 7.5 mph wind Summer (Assumption 3.2.2)	ASHRAE Fundamentals 2005, Table 1, p25.2	0.25
Concrete 48" thick at density of 150 lb/ft ³ (Reference 2.2.1, Section 4.2.11.6.6)	ASHRAE Fundamentals 2005, Table 4, p25.8	1.80
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
	Total Resistance, R _T =	2.73
	U-Value = 1/R _T , Btu/h-ft²-°F	0.37

Partition U-Values

The elements of construction come from the General Arrangement Drawings (Assumption 3.1.1). Values of resistance come from ASHRAE Fundamentals (Reference 2.2.4, Chapter 25) and ASHRAE Std. 90.1-2004 (Reference 2.2.6, Table A9.2B). The concrete density of 150 pounds per cubic foot comes from Section 4.2.11.6.6 of the Project Design Criteria Document (Reference 2.2.1).

Table A-6. Partition No. 1: 4'- 0" Thick Concrete, no insulation

Element	Reference	Resistance, R ft²-°F-h/Btu
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
Concrete 48" thick at density of 150 lb/ft ³	ASHRAE Fundamentals 2005, Table 4, p25.8	3.60
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
	Total Resistance, R_T =	4.96
	U-Value = 1/R _T , Btu/h-ft ² -°F	0.20

Table A-7. Partition No. 2: Gypsum Board, One-Hour Fire Rated

Element	Reference	Resistance, R ft²-°F-h/Btu
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
5/8" gypsum board	ASHRAE Fundamentals 2005, Table 4, p25.5	0.56
4" metal stud, 24" O.C. with air space. No insulation.	ASHRAE 90.1 - 2004, Table A9.2B, Effective resistance. (Reference 2.1.13)	0.91
5/8" gypsum board	ASHRAE Fundamentals 2005, Table 4, p25.5	0.56
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
	Total Resistance, R _T =	3.39
	U-Value = 1/R _T , Btu/h-ft ² -°F	0.30

Table A-8. Partition No. 3: 2'- 0" Thick Concrete, no insulation

Element	Reference	Resistance, R ft²-°F-h/Btu
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
Concrete 24" thick at density of 150 lb/ft ³	fASHRAE Fundamentals 2005, Table 4, p25.8	1.80
Still Air, Horizontal Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.68
	Total Resistance, R _T =	3.16
	U-Value = 1/R _T , Btu/h-ft²-°F	0.32

Table A-9. Concrete Floor (2nd Floor): 1'- 6" Thick

Element	Reference	Resistance, R ft²-°F-h/Btu
Still Air, Downward Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.92
Concrete 18" thick at density of 150 lb/ft ³	ASHRAE Fundamentals 2005, Table 4, p25.8	1.35
Still Air, Downward Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.92
	Total Resistance, R_T =	3.19
	U-Value = 1/R _T , Btu/h-ft²-°F	0.31

Table A-10. Concrete Floor (2nd Floor): 1'- 6" Thick

Element	Reference	Resistance, R ft²-°F-h/Btu
Still Air, Upward Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	0.61
Concrete 18" thick at density of 150 lb/ft ³	ofASHRAE Fundamentals 2005, Table 4, p25.8	1.35
Still Air, Upward Flow	ASHRAE Fundamentals 2005, Table 1, p25.2	. 0.61
	Total Resistance, R _T =	2.57
	U-Value = 1/R _τ , Btu/h-ft²-°F	0.39

Interior and Exterior Roll-up Door U-Value

Table A-11. Door: Metal Roll-up

Element	Reference	Resistance, R ft²-ºF-h/Btu					
See Assumption 3.1.12							
	U-Value = Btu/h-ft²-°F	1.15					

Floor F-Factor

For calculating the heat loss during winter, for slab-on-grade construction, the floor F-Factor is 0.73, according to *Energy Standard for Buildings Except Low-Rise Residential Buildings* (Reference 2.2.6, Table 5.5-5 and Appendix B) based on climate zone and building envelope requirements.

APPENDIX B: ASHRAE TABLE VALUES FOR CLTD AND CORRECTION TABLES FOR LATITUDE AND MONTH

Table B-1 presents the unadjusted Cooling Load Temperature Difference (CLTD) and Cooling Load Factor (CLF) values used in this calculation. The unadjusted roof CLTD values come from Table 3.8 of the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3, p. 3.19). The unadjusted wall CLTD values come from Table 3.10, p. 3.21, of the same reference. The CLF for Lights, People, and Equipment are based on the similar tables in Chapter 4 of the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3, pp. 4.4, 4.6, and 4.9). All Cooling Load Factors are equal to 1.0, based on Assumption 3.2.6, Assumption 3.2.7, and Assumption 3.2.8. See Section 6.1.3 of this calculation for determination of roof and wall types and additional information on correcting the unadjusted values for latitude-month, color, indoor design temperature, and outdoor design temperature.

Table B-2 presents the CLTD correction for latitude and month related to the design latitude for this building, as given in Section 6.1.1. The CLTD correction values were interpolated from the 32 degree and 40 degree North latitude values given in Table 3.12 of the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3, p. 3.23). Table B-3 presents the winter outdoor design temperature of 24°F dry bulb and 20°F wet bulb and the summer outdoor design temperature of 102°F dry bulb and 65°F wet bulb. For the summer the four months: June, July, August, and September, are assigned for conservatism. All *K* factors for roof and wall color are taken at a value of 1.0, per Assumption 3.2.3. The *f* factor for the roof CLTD correction is taken at a value of 1.0, for conservatism.

For flat roofs, the following formula (Reference 2.2.3, Table 3.8, Note 2, p. 3.19) is used to correct the roof CLTD values:

$$CLTD_{roof,corr} = [(CLTD + LM) \times K + (78^{\circ}F - T_r) + (T_o - 85^{\circ}F)] \times f$$
 (Eq. B-1)

where

CLTD =from Table B-1

LM = Latitude-month correction from Table B-2, for a horizontal surface

K = Color adjustment factor, equal to 1.0 (Assumption 3.2.3)

 T_r = Indoor design room temperature, °F

 T_o = Average outside temperature on design day, °F. $T_o = 102$ °F - (25.9/2) = 89.05°F for a 102°F outdoor design temperature

f = factor for attic fan and/or ducts above ceiling taken at a value equal to 1.0 for no attic fan or ducts and a value equal to 0.75 for positive ventilation

For sunlit walls, the following formula (Reference 2.2.3, Table 3.10, Note 2, p. 3.21) is used to correct the wall CLTD values:

$$CLTD_{wall,corr} = (CLTD + LM) \times K + (78^{\circ}F - T_r) + (T_o - 85^{\circ}F)$$
 (Eq. B-2)

where

CLTD = from Table B-1

LM = Latitude-month correction from Table B-2

K = Color adjustment factor, equal to 1.0 (Assumption 3.2.3)

 T_r = Indoor design room temperature, °F

 T_o = Average outside temperature on design day, °F. $T_o = 102$ °F - (25.9/2) = 89.05°F for a 102°F outdoor design temperature

Table B-1. Unadjusted CLTD Values and CLF Values (°F)

Hour	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Roof 1 (Type 12) (Note 1 & 7)	31	28	25	22	20	17	15	14	14	16	18	22	26	31	36	40	43	45	45	44	42	40	37	34
Roof 2 (Type 1) (Note 1 & 8)	6	3	0	-1	-3	-3	-2	4	14	27	39	52	62	70	74	74	70	62	51	38	28	20	14	9
Group B Wall -N (Note 2)	15	14	14	13	12	11	11	10	9	9	9	8	9	9	9	10	11	12	13	14	14	15	15	15
-NE (Note 2)	19	18	17	16	15	14	13	12	12	13	14	15	16	17	18	19	19	20	20	21	21	21	20	20
-E (Note 2)	23	22	21	20	18	17	16	15	15	15	17	19	21	22	24	25	26	26	27	27	26	26	25	24
-SE (Note 2)	23	22	21	20	18	17	16	15	14	14	15	16	18	20	21	23	24	25	26	26	26	26	25	24
-S (Note 2)	21	-20	19	18	17	15	14	13	12	11	11	11	11	12	14	15	17	19	20	21	22	22	22	21
-SW (Note 2)	27	26	25	24	22	21	19	18	16	15	14	14	13	13	14	15	17	20	22	25	27	28	28	28
-W (Note 2)	29	28	27	26	24	23	21	19	18	17	16	15	14	14	14	15	17	19	22	25	27	29	29	30
-NW (Note 2)	23	22	21	20	19	18	17	15	14	13	12	12	12	11	12	12	13	15	17	19	21	22	23	23
Group G Wall -N (Note 2)	3	2	1	0	-1	2	7	8	9	12	15	18	21	23	24	24	25	26	22	15	11	9	7	5
-NE (Note 2)	3	2	1	0	-1	9	27	36	39	35	30	26	26	27	27	26	25	22	18	14	11	9	7	5
-E (Note 2)	4	2	1	0	-1	11	31	47	54	55	50	40	33	31	30	29	27	24	19	15	12	10	8	6
-SE (Note 2)	4	2	1	0	-1	5	18	32	42	49	51	48	42	36	32	30	27	24	19	15	12	10	8	6
-S (Note 2)	4	2	1	0	-1	0	1	5	12	22	31	39	45	46	43	37	31	25	20	15	12	10	8	5
-SW (Note 2)	5	4	3	1	0	0	2	5	8	12	16	26	38	50	59	63	61	52	37	24	17	13	10	8
-W (Note 2)	6	55	3	2	1	1	2	5	8	11	15	19	27	41	56	67	72	67	48	29	20	15	11	8
-NW (Note 2)	5	3	2	1	0	0	2	.5	8	11	15	18	21	27	37	47	55	55	41	25	17	13	10	7
Glass (Note 3)	1	0	-1	-2	-2	-2	-2	0	2	4	7	9	12	13	14	14	13	12	10	8	6	4	3	2
																			ļ		L			<u></u>
ASHRAE TABLE VALUES FOR CLF								,				~										,		
Lights (Note 4)	1	1	1	1	1	.1	1	1	1.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
People (Note 5)	1	_1_	1	1	1	1	1	1	1	1	11	1	1	1	1	1	1	1	1	1	1	1	1	1
Equipment hooded (N/A)	1	1	1	1	1	1	11	1	1	1	1	1	1	1	1	1	11	1	1	1	1	1	1	1
Equip. non-hooded (Note 6)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	, 1	1	1	1

Notes:

- 1. From Table 3.8 in Reference 2.2.3.
- 2. From Table 3.10 in Reference 2.2.3.
- 3. From Table 3.23 in Reference 2.2.3.
- 4. From Assumption 3.2.6.
- 5. From Assumption 3.2.7.
- 6. From Assumption 3.2.8.
- 7. The unadjusted values listed here are for a Type 12 roof. But because the RF insulated concrete roof has a much higher resistance (See U-Value Calculation in Appendix A) compared to the Type12 roof listed in Table 3.8 of the Cooling and Heating Load Calculation Manual (Reference 2.2.3, page 3.19) Note 4 of Table 3.8 is used to determine that an effective CLTD of 29°F should be used in the Cooling Load Calculation.

 8. The roof type selected in this calculation for the sheet metal roof is Type 1. The unadjusted CLTD values in this table are from a Type 2 roof because the requirement from Note 4 of Table 3.8 in the Cooling and Heating Load
- 3. The roof type selected in this calculation for the sheet metal roof is Type 1. The unadjusted CLTD values in this table are from a Type 2 roof because the requirement from Note 4 of Table 3.8 in the Cooling and Heating Load

 Calculation Manual (Reference 2.2.3, page 3.19) was used. Since, the RF metal roof has a higher value by over R-7 and less than R-14 (See U-Value Calculation in Appendix A) the CLTD data was analyzed and the Type 2 CLTD data

 was chosen as the best set of values to use in this calculation.

Appendix B 105 December 2007

Table B-2. CLTD Correction For Latitude and Month Applied to Walls and Roofs (°F)

North Latitude	Month	N	NNE NNW	NE NW	ENE WNW	E W	ESE WSW	SE SW	SSE SSW	s	HOR
	Dec	-5.58	-7.58	-10.00	-12.16	-9.16	-6.16	0.85	7.85	10.85	-19.31
	Jan/Nov	-5.00	-7.00	-9.58	-11.58	-8.58	-5.16	1.42	8.42	11.42	-17.31
,	Feb/Oct	-4.58	-6.58	-7.58	-8.58	-5.16	-2.58	3.42	8.00	11.58	-12.31
36.62	Mar/Sep	-3.58	-4.58	-4.58	-5.16	-2.58	-1.00	3.58	6.16	8.73	-6.73
	Apr/Aug	-2.00	-2.58	-1.58	-2.00	0.00	-0.42	1.16	2.16	2.73	-2.16
	May/Jul	0.42	0.42	0.42	0.00	0.00	-0.42	-0.42	-1.27	-0.69	1.00
	Jun	1.00	1.42	1.42	0.42	0.58	-0.85	-0.85	-2.27	-2.27	2.00

NOTE:

All values from interpolation of Table 3.12 in Reference 2.2.3.

Table B-3. Monthly Outdoor Design Temperatures

	Outside Desig	n Temperature
Month	db F	wb F
JAN	24	20
JUN	102	65
JUL	102	65
AUG	102	65
SEP	102	65
DEC	24	20

NOTE:

The summer outdoor design temperature of 102°F dry bulb and 65°F wet bulb are assigned for the four months: June, July, August, and September, for conservatism.

APPENDIX C: COOLING/HEATING LOAD EQUATIONS

Table C-1 contains the equations used by the CLTD/CLF cooling load calculation method discussed in the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3). The table references given after the definition of the equation variable in Table C-1 are specific to the *Cooling and Heating Calculation Manual*. In many instances, newer sources and other sources have been used. See the main body of the calculation for those sources.

Table C-1. Cooling Load Equations

Load Source	Cooling Load Equation	Equation No.	Reference, Tables, Description [From ASHRAE GRP 158, Cooling and Heating Load Manual (Reference 2.2.3)]
			U = Design Heat transmission Coefficients, Btu/(hr ft² °F) - Tables 3.1 - 3.5; A3.1 and A3.2,
		·	A = Areas Calculated from Building Plans, ft ²
			CLTD = Cooling Load Temperature Difference at Base Condition for Roofs, °F - Table 3.8 and Notes
			Note 2 - Correction for color of Exterior surface
Roof	q = U × A × CLTD	Equation C-1	Note 2 - Correction for Outside Dry Bulb Temperature and Daily Range - Table 3.13
			Note 2 - Correction for Inside Dry Bulb Temperature - Table 3.13
			Note 2 - Application of Latitude and Month - Table 3.12
			Note 4 – For a more conservative roof load result, corrections for additional insulation are not used.
•			U = Design Heat transmission Coefficients, Btu/(hr ft² °F) - Tables 3.1 - 3.4; A3.1 and A3.2
			A = Areas Calculated from Building Plans, ft ²
			CLTD = Cooling Load Temperature Difference at Base Condition for Wall Group, °F - Table 3.9, 3.10 + Notes
Walls	q = U × A × CLTD	Equation C-2	Note 2 - Correction for color of Exterior surface
			Note 2 - Correction for Outside Dry Bulb Temperature and Daily Range - Table 3.13
			Note 2 - Correction for Inside Dry Bulb Temperature - Table 3.13
,			Note 2 - Application of Latitude and Month - Table 3.12
	i		U = Overall Heat Transmission Coefficient for type of Glass and Interior Shading, if used, Btu/(hr ft² °F) - Tables 3.14 - 3.16 & A3.4
			A = Glass Areas Calculated from Building Plans, ft ²
Glass Conduction	q = U × Å × CLTD	Equation C-3	CLTD = Cooling Load Temp. Difference for Conduction Load through Glass, °F - Table 3.23
			Correction for Outside Dry Bulb Temperature and Daily Range - Table 3.13
			Correction for Inside Dry Bulb Temp. Table 3.13

Load Source	Cooling Load Equation	Equation No.	Reference, Tables, Description [From ASHRAE GRP 158, Cooling and Heating Load Manual (Reference 2.2.3)]
			A = Glass Area Calculated from Building Plans, ft ²
			SC = Shading coefficients for combined type of Glass and type of shading - Table 3.17 - 3.22
			SHGF = Solar Heat Gain Factor for specific orientation of surface, Btu/(hr ft²)
			Latitude and Month - Table 3.25 for no external shading
Glass Solar	q = A × SC × SHGF × CLF	Equation C-4	Externally shaded - Location less than 24 deg Latitude - Table 3.26
	·		Location at or more than 24 deg Latitude - Table 3.25-N orient.
			CLF = Cooling Load Factor
		•	With no interior shading - Table 3.27
			With interior shading - Table 3.28
			For glass areas shaded externally, use north orientation with either Table 3.27 or 3.28.
			U = Design Heat transmission Coefficients, Btu/(hr ft² °F) - Tables 3.1 - 3.5 & A3.1
Partitions, Ceilings, Floors	q = U × A × TD	Equation C-5	A = Areas Calculated from Building Plans, ft ²
			TD = Design Temperature Difference between rooms, °F
			Input = Input rating from electrical Plans or Lighting Fixture data, Btu/h - Table 4.1
			Coefficient "a" and "b" for type of fixture - Tables 4.2 & 4.3
Internal Lights	q = Input × CLF	Equation C-6	CLF = Cooling Load Factor based on total hours of operation and time - Table 4.4
	·		Note 1: Correction for Schedule of Operation of Lights and Cooling System, CLF=1when cooling system is operated only when lights are on or when lights are on 24 hrs/day.
			No. = Number of People in space, from survey or Table 5.3
People Sensible	q = No. × Sens. HG × CLF	Equation C-7	Sens. HG = Sensible Heat Gains from Occupants, Btu/h - Table 4.5
			CLF = Cooling Load Factor - based on duration of occupancy and time of entry - Table 4.6
Decade Latari	n – No. v. Lotost II.O	Faustice C.C.	No. = Number of People in space, from survey or Table 5.3
People Latent	q = No. × Latent HG	Equation C-8	Latent HG = Latent Heat Gain from Occupants, Btu/h - Table 4.5
Equipment/			Heat Gain = Recommended rate of heat gain - sensible heat, Btu/h - Tables 4.8 & 4.9
	q = Heat Gain × CLF	Equation C-9	CLF = Cooling Load Factor
Sensible			For use with hood - Table 4.10
			For use without hood - Table 4.11

Load Source	Cooling Load Equation	Equation No.	Reference, Tables, Description [From ASHRAE GRP 158, Cooling and Heating Load Manual (Reference 2.2.3)]
Equipment/			Heat Gain = Recommended rate of heat gain, Btu/h
Appliances	q = Heat Gain	Equation C-10	Latent heat without hood - Tables 4.8 & 4.9
Latent		-	Set Equal to zero when hood is used over appliances.
		F	Heat Gain = Manufacturer's Data or Tables 4.12 & 4.13, Btu/h
Power	q = Heat Gain × CLF	Equation C-11	CLF = Cooling Load Factor - Table 4.11 or CLF = 1.0 if cooling system is not operated continuously

Table C-2 contains the equations used by the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3) to calculate the heating load for roofs, walls, glass, and floors over exterior spaces. The table references given after the definition of the equation variable in Table C-2 are specific to the *Cooling and Heating Calculation Manual*. In many instances, newer sources and other sources have been used. See the main body of the calculation for those sources. The equation for calculating the heating load from slab-on-grade floors is from *2005 ASHRAE Fundamentals* (Reference 2.2.4, Chapter 29, p. 29.13).

Table C-2. Heating Load Equations

Heating Load	Heating Load Equation	Equation No.	Reference, Tables, Description
			[From ASHRAE GRP 158, Cooling and Heating Load Manual (Reference 2.2.3)]
Roofs, Walls, Partitions, Glass	q = U × A × TD	Equation C-12	U = Design Heat transmission Coefficients, Btu/(hr ft ² °F) - Tables 3.1 - 3.5; A3.1 and A3.2,
			A = Areas Calculated from Building Plans, ft ²
,			TD = Temperature Difference between inside design db and design outside db – Table 2.1
	:		[From ASHRAE GRP 158, Cooling and Heating Load Manual (Reference 2.2.3)]
Floors over exterior space	q = U × A × TD	Equation C-13	U = Design Heat transmission Coefficients, Btu/(hr ft ² °F) - Tables 3.1 - 3.5; A3.1 and A3.2,
·	•		A = Areas Calculated from Building Plans, ft ²
			TD = Temperature Difference between inside design db and design outside db – Table 2.1
			From ASHRAE Fundamentals (Reference 2.2.4, Chapter 29, Equations 39 and 40)
Slab-on-grade	$q = F_p \times P \times TD$	Equation C-14	F _p = Heat loss coefficient per foot of perimeter, Btu/(hr ft ² °F)
floors	1		P = Perimeter (exposed edge) of slab, ft.
			TD = Temperature Difference between inside design db and ambient temperature, °F

Table C-3 contains the equations used by the *Cooling and Heating Load Calculation Manual* (Reference 2.2.3) to calculate the sensible and latent heating and cooling loads for infiltration and ventilation. The table references given after the definition of the equation variable in Table C-3 are specific to the *Cooling and Heating Calculation Manual*. In many instances, newer sources and other sources have been used. See the main body of the calculation for those sources.

Table C-3. Infiltration and Ventilation Cooling and Heating Load Equations

Heating Load	Equation	Equation No.	Reference, Tables, Description
Sensible	q = density x 0.24 x 60 x Airflow cfm		[From ASHRAE GRP 158, Cooling and Heating Load Manual (Reference 2.2.3)]
	x TD		Airflow cfm = Ventilation/Infiltration Air, Standard Airflow cfm, Chapter 5
Latent	q = 4840 x Airflow cfm x (W ₁	Equation C-15	TD = Temperature Difference between inside design db and Outside temperatures, °F
Total	$-W_2$) q = 4.5 x Airflow		Inside – Outside Humidity Ratio, lb. water/lb dry air, Table 2.1 & Table 2.3
	cfm x (H ₁ – H ₂)		Inside – Outside Air Enthalpy, Btu/lb. dry air, Table 2.1 & Table 2.3

APPENDIX D: PSYCHROMETRIC CALCULATION EQUATIONS

The following methods and equations are used to numerically calculate the various thermodynamic properties of moist air. These equations are derived from Chapter 6 of the 2005 ASHRAE Handbook, Fundamentals (Reference 2.2.4). These equations are used throughout the calculation whenever individual air properties, mixed air properties, sensible heat gain, latent heat gain, and total heat gain need to be calculated.

1. Barometric Pressure, P - [Equation 3, p. 6.1]

$$P = K \cdot \left[1 - 6.8754 \times 10^{-6} Z \right]^{5.2559}$$
 (Eq. D-1)

where

P = barometric pressure (in. w.g.; in. Hg; or psia)

Z = elevation above sea level (ft)

K = a constant (407.1894 in. w.g./atm, 29.921 in. Hg/atm., or 14.696 psia/atm.)

2. Water Vapor Saturation Pressure, Pws (for Temperature < 32°F) [Equation 5, p. 6.2]

$$\ln P_{ws} = C1/R + C2 + C3 \cdot R + C4 \cdot R^2 + C5 \cdot R^3 + C6 \cdot R^4 + C7 \cdot \ln R$$
(Eq. D-2)

or

$$P_{ws} = e^{\ln Pws}$$

where

 P_{ws} = saturation pressure, psia (at the dry bulb or wet bulb temperature)

R = absolute Temp, ${}^{\circ}R$ = (T + 459.67)

 $T = \text{dry or wet bulb temperature, } ^{\circ}F$

C1 = -1.0214165E+04

C2 = -4.8932428E+00

C3 = -5.3765794E-03

C4 = 1.9202377E-07

C5 = 3.5575832E-10

C6 = -9.0344688E-14

C7 = 4.1635019E+00

3. Water Vapor Saturation Pressure, Pws (for Temperature = or > 32°F) [Equation 6, p. 6.2]

$$\ln P_{ws} = C8/R + C9 + C10 \cdot R + C11 \cdot R^2 + C12 \cdot R^3 + C13 \cdot \ln R$$
 (Eq. D-3)

or

$$Pws = e^{\ln Pws}$$

where

 P_{ws} = saturation pressure, psia (at the dry bulb or wet bulb temperature)

R = absolute Temp, °R = (T + 459.67)

 $T = \text{dry or wet bulb temperature, } ^{\circ}F$

C8 = -1.0440397E + 04

C9 = -1.1294650E+01

C10 = -2.7022355E-02

C11 = 1.2890360E-05

C12 = -2.4780681E-09

C13 = 6.5459673E+00

4. Humidity Ratio or Moisture Content, W [Equation 35, p. 6.13]

$$W = \frac{\left(1093 - 0.556T_{wb}\right) \cdot Ws - 0.24 \cdot \left(T_{db} - T_{wb}\right)}{1093 + 0.444T_{db} - T_{wb}}$$
(Eq. D-4)

where

W = humidity Ratio or Moisture content, lb water/lb dry air

 $W_S = 0.62198 \left[(P_{ws}/(P - P_{ws})) \right]$

 $Pws = \text{saturation pressure (for } T_{db}), \text{ psia (from Equation D-2 or Equation D-3 above)}$

P = barometric pressure, psia (from Equation B-1 above)

T_{db} = dry bulb temperature, °F T_{wb} = wet bulb temperature, °F

5. Water Vapor Partial Pressure, Pw [Equation 38, p. 6.13]

$$P_W = (P \cdot W)/(0.62198 + W)$$
 (Eq. D-5)

where

 P_W = water vapor partial pressure, psia

P = barometric pressure, psia (from Equation D-1 above)

W = humidity ratio, lb water/lb dry air (from Equation D-4 above)

6. Relative Humidity [Equation 24, p. 6.12]

$$RH = (P_w / P_{wx}) \cdot 100$$
 (Eq. D-6)

where

RH = relative humidity, percent

 P_w = water vapor partial pressure, psia (from Equation D-5 above)

 P_{ws} = saturation pressure (for T_{db}), psia (from Equation D-2 or Equation D-3 above)

7. Specific Volume [Equation 28, p. 6.12]

$$v = [0.3704 \cdot (T_{db} + 459.67) \cdot (1 + 1.6078 \cdot W) / P]$$
 (Eq. D-7)

where

v = specific volume, cu. ft./lb dry air

 T_{db} = dry bulb temperature, °F

W = humidity ratio, lb water/lb dry air (from Equation D-4 above)

P = total pressure, psia (from Equation B-1 above)

8. Density of moist air mixture, d [Equation 11, p. 6.2]

$$d = (1/\nu) \cdot (1+W)$$
 (Eq. D-8)

where

d = density, lb/cu. ft.

v = specific volume, cu. ft./lb dry air (from Equation D-7 above)

W = humidity ratio, lb water/lb dry air (from Equation D-4 above)

9. Enthalpy, h [Equation 32, p. 6.13]

$$h = (0.24 \cdot T_{db}) + [W \cdot (1061 + (0.444 \cdot T_{db}))]$$
 (Eq. D-9)

where

h = enthalpy, Btu/lb dry air

 T_{db} = dry bulb temperature, °F

W = humidity ratio, lb water/lb dry air (from Equation D-4 above)

10. Dew Point, Td (for Temperature < 32°F) [Equation 40, p. 6.13]

$$T_d = 90.12 + [26.142 \cdot Ln(P_w)] + [0.8927 \cdot (Ln(P_w))^2]$$
 (Eq. D-10)

where

 T_d = dew point temperature, °F

Ln =natural logarithm

 P_w = water vapor partial pressure, psia (from Equation D-5 above)

11. Dew Point, Td (for Temperature = or > 32°F) [Equation 39, p. 6.13]

$$T_d = 100.45 + [33.193 \cdot Ln(P_w)] + [2.319 \cdot (Ln(P_w))^2] + [0.17074 \cdot (Ln(P_w))^3] + [1.2063 \cdot (P_w)^{0.1984}]$$
(Eq. D-11)

where

 T_d = dew point temperature, °F

Ln =natural logarithm

 P_w = water vapor partial pressure, psia (from Equation D-5 above)

12. Mass of dry air, Mass

$$M = CFM/v (Eq. D-12)$$

where

M = mass of air, lb/min

Airflow cfm = airflow rate, cu. ft./min

ν = specific volume, cu. ft./lb dry air (from Equation D-7 above)

13. Mixed Air Psychometric (Adiabatic Mixing) [Equation 46, p. 6.17]

$$\dot{M}$$
Prop = $[(Prop1 \cdot Mass1) + (Prop2 \cdot Mass2)]/[Mass1 + Mass2]$

(Eq. D-13)

where

Mprop = property of mixed air, enthalpy (h) or humidity ratio (W)

Prop1 = property of air stream #1, enthalpy (h) or humidity ratio (W)

Mass 1 = mass of dry air stream #1, lb/min (from Equation D-12 above)

Prop2 = property of air stream #2, enthalpy (h) or humidity ratio (W)

Mass2 = mass of air stream #2, lb/min (from Equation D-12 above)

NOTE: It should be noted that only the enthalpy and the humidity ratio follows the above equation. Knowing two properties (h and W), the rest of the other psychometric properties are determined using the equations found in Items 1 to 12. Also, wet bulb temperature calculation using the humidity ratio equation above will require trial and error because the saturated water pressure (P_{ws}) based on wet bulb temperature is required in the humidity ratio calculation. For initial value of the wet bulb temperature, the value determined from the mixed air equation above may be used, and then adjusted accordingly until the values converge.

14. Total Sensible Heat and Air flow Equation [Equation 43, p. 6.16]

From Equation D-16,

$$Q = (CFM \cdot d) \cdot 60 \cdot (h_L - h_E);$$

Substituting the value of enthalpy, h from Equation D-9 equation (with $W_{E} = W_{L}$):

$$Q_s = CFM \cdot 60 \cdot d_E \cdot (0.24 + 0.444W) \cdot (T_L - T_E)$$
 (Eq. D-14)

where

= sensible heat gain, Btu/h Qs. $Airflow \ cfm = airflow \ rate, \ cu. \ ft./min$ = density of incoming air, lb/cu. ft. @ T_F = humidity ratio, lb water vapor/lb dry air W = dry bulb temperature of leaving air, °F T_L = dry bulb temperature of entering air, °F T_E 60 = minutes per hour = specific heat of dry air, Btu/lb °F 0.24 = specific heat of water vapor, Btu/lb °F 0.444

The value of 0.444W being very small is disregarded.

15. Latent Heat and Air flow Equation [Equation 43, p. 6.16]

From Equation B-16,

$$Q = (CFM \cdot d) \cdot 60 \cdot (h_L - h_E);$$

Substituting the value of enthalpy, h from Equation D-9 equation (with $T_{E} = T_L$):

$$Q_L = CFM \cdot 60 \cdot d_E \cdot (1061 + 0.444T_E) \cdot (W_L - W_E)$$
 (Eq. D-15)

where

 Q_L = latent heat gain, Btu/h d_E = density of incoming air, lb/cu. ft. @ T_E T_E = dry bulb temperature of entering air, °F W_L = humidity ratio of leaving air, lb water vapor/lb dry air W_E = humidity ratio of entering air, lb water vapor/lb dry air

60 = minutes per hour

1061 = energy content of water vapor at 50% RH and 75°F, Btu/lb °F

0.444 = specific heat of water vapor, Btu/lb °F

16. Grand Total Heat and Air flow Equation [Equation 45, p. 6.16]

$$Q_T = CFM \cdot d_E \cdot 60 \cdot (h_L - h_E) - [(W_L - W_E) \cdot h_{WL}]$$
 (Eq. D-16)

where

= Grand Total heat gain, Btu/h Q_T = airflow rate in cu. ft/min Airflow cfm = density of incoming air, lb/cu. ft. d_E 60 = minutes per hour = enthalpy of leaving air, Btu/lb dry air (from Equation D-9 above) h_L = enthalpy of entering air, Btu/lb dry air (from Equation D-9 above) h_E = humidity ratio of leaving air, lb water vapor/lb dry air W_L = humidity ratio of entering air, lb water vapor/lb dry air W_E = enthalpy of condensed water leaving, Btu/lb water. h_{WL}

NOTE: The value of $[(W_L - W_S) \cdot h_{WL}]$ is negligible and is ignored.

APPENDIX E: ROOM EQUIPMENT HEAT GAIN LIST

The Room Equipment Heat Gain List was originally assembled by asking each group/discipline to provide a list of equipment; they specified equipment room-by-room with their corresponding heat load and approximate number of hours or usage within a 24-hour period. After some follow-up conversations with each group/discipline, a Room Equipment Heat Gain List was assembled. Confirmation responses and original e-mails from each group/discipline are contained in Attachments 1 through 6 and Attachment 8.

Table E-1. Equipment Heat Gain List

(See Assumption 3.1.4)

							(See A	ssumption 3	1.4)			· · · · · · · · · · · · · · · · · · ·		T		
Room No.	Room Name	Heat Source Note 1	Qty . Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9	Intermittent		Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h	Originating Group/ Discipline	Remarks
1002	LID BOLTING ROOM	SITE TRANSPORTER	1	0.25	0.85	75.0	HP	Α	212,000			x	11,263		Mechanical Handling	See Attachment 8 & Note 15
1002	LID BOLTING ROOM	CASK PREPARATION PLATFORM	1	1.00	0.85	5.0	HP	Α	15,500		Х	·	0		Mechanical Handling	See Attachment 8
1002	LID BOLTING ROOM	LOADING ROOM SHIELD DOOR	1	0.10	1.00	(2) 7.5	HP	Α	22,700 each		X		1,135		Mechanical Handling	See Attachment 6 & Note 15
1002	LID BOLTING ROOM	TAD	1	1.00	1.00	25.0	KW	N/A	85,325			x	85,325		Thermal Analysis	See Attachment 1
1002	LID BOLTING ROOM	LID BOLTING RM. CRANE (VFD) RATED 10 TON	1	0.35	1.00	25	HP	Α	72,300		х		6,326		Mechanical Handling	See Attachment 6 & Note 15
1002	LID BOLTING ROOM	LID BOLTING RM. CRANE ASD	1	0.35	1.00	25	HP	Α	2388		х	-	209			See Note 15
1002	LID BOLTING ROOM	AREA RADIATION MONITOR	. 8	1.00	1.00	16	Watts	N/A	55	Х			437		ES&H	See Attachment 3
1002	LID BOLTING ROOM	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	X			1174		ES&H	See Attachment 3
1002	LID BOLTING ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	Х			341		1&C	See Attachment 4
1002	LID BOLTING ROOM	MISC. EQUIPMENT	1	1.00	1.00				26,117	х			26,117		Mechanical Handling	See Note 16
1002	LID BOLTING ROOM_	·												132,327		
1003A	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	3	1.00	1.00	30	Watts	N/A	102	x			307	•	ES&H	See Attachment 3
1003A	CORRIDOR													307		
1003B	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	2	1.00	1.00	30	Watts	N/A	102	x			205		ES&H	See Attachment 3
1003B	CORRIDOR													. 205		
1003E	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	Watts	N/A	102	×			102		ES&H	See Attachment 3
1003E	CORRIDOR													102		
1003F	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	2	1.00	1.00	30	Watts	N/A	102	х			205	·	ES&H	See Attachment 3
1003F	CORRIDOR	,												. 205		
1003G	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	3	1.00	1.00	30	Watts	N/A	102	х			307		ES&H	See Attachment 3
1003G	CORRIDOR													307		
1004	HVAC ROOM (ITS HEPA	EXH-G EXHAUST FAN	1	1.00	1.00	200	HP	С	50,300	Х			50,300		HVAC	See Attachment 5 and

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9	Intermittent		Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originating Group/ Discipline	Remarks
	EXHAUST TRAIN A)	EVILO EVILALIOT FANI									<u> </u>					Assumption 3.1.22
1004	HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	EXH-G EXHAUST FAN ASD	1	1.00	1.00	200	HP	С	10,426	X			10,426	•	HVAC	See Attachment 5 and Note 14
1004	HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	х			437		ES&H	See Attachment 3
1004	HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	X			1,174	;	ES&H	See Attachment 3
1004	HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	RIO	1	1.00	1.00	100	Watts	N/A	341	х			341		1&C	See Attachment 4
1004	HVAC ROOM (ITS HEPA EXHAUST TRAIN A)													62,678		
1004A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN A)	200-VCTO-EXH-00009 EXHAUST FAN	1	1.00	1.00	5	HP.	С	2,790	x		·	2,790		HVAC	See Attachment 5, Assumption 3.1.22 & Note 17
1004A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN A)	200-VCTO-EXH-00009 EXHAUST FAN ASD	1	1.00	1.00	5	HP	C	1,471	x			1,471	71000 8100 8100	HVAC	See Attachment 5, Note 14 & Note 17
1004A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN A)	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	x	·	·	437	1 4	ES&H	See Attachment 3
1004A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN A)	CONTINUOUS AIR MONITOR	8	1.00	1.00	150	Watts	N/A	512	x	·		4,096		ES&H	See Attachment 3
1004A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN A)	·												8,794		
1012	LLW STAGING ROOM	AREA RADIATION MONITOR	10	1.00	1.00	16	Watts	N/A	55	x			546	:	ES&H	See Attachment 3
1012	LLW STAGING ROOM	CONTINUOUS AIR MONITOR	10	1.00	1.00	43	Watts	N/A	147	Х			1,466		ES&H	See Attachment 3
1012	LLW STAGING ROOM	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	Watts	N/A	102	×		·	102		ES&H	See Attachment 3
1012	LLW STAGING ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	Х			341		I&C	See Attachment 4
1012	LLW STAGING ROOM	LLW LIQUID SUMP PUMP	1	1.00	1.00	2	HP	C.	1350		X		0	J.	Mechanical Process	See Attachment 5
1012	LLW STAGING ROOM	LLW SAMPLING PUMP	1	1.00	1.00	0.5	HP	С	850		х		0		Mechanical Process	See Attachment 5
1012	LLW STAGING ROOM						,							2,455		
1013	LOADING ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	х			437		ES&H	See Attachment 3
1013	LOADING ROOM	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	x			1174		ES&H	See Attachment 3
1013	LOADING ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	Х			341		I&C	See Attachment 4
1013	LOADING ROOM	TAD	1	1.00	1.00	25.0	ĸw	N/A	85,325			×	85,325		Thermal	See Attachment 1

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9		Simultaneous Operation (Intermittent) Note 11	Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originating Group/ Discipline Analysis	
1013	LOADING ROOM	SITE TRANSPORTER	1	0.25	0.85	75.0	HP	А	212,000			х	45,050		Mechanical Handling	See Attachment 8
1013	LOADING ROOM													132,327		
1014	MAINTENANCE ROOM	CHW PUMP	1	1.00	1.00	50	HP	С	15,700	х			15,700		Mechanical Process	See Attachment 5 and Assumption 3.1.22
1014	MAINTENANCE ROOM	CHW PUMP ASD	1	1.00	1.00	50	HP	С	3,538	х			3,538		Mechanical Process	See Attachment 5 and Note 14
1014	MAINTENANCE ROOM	TBD HW PUMP	1	1.00	1.00	15	HP	С	6,210	х			6,210		Mechanical Process	See Attachment 5 and Assumption 3.1.22
1014	MAINTENANCE ROOM	TBD HW PUMP ASD	1	1.00	1.00	15	HP	С	1,930	X			1,930		Mechanical Process	See Attachment 5 and Note 14
1014	MAINTENANCE ROOM											·		27,378		
1015	CASK UNLOADING ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	х	·		437		ES&H	See Attachment 3
1015	CASK UNLOADING ROOM	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	х			1174		ES&H	See Attachment 3
1015	CASK UNLOADING ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	X			341	ч	I&C	See Attachment 4
1015	CASK UNLOADING ROOM	TAD	1	1.00	1.00	25.0	кw	N/A	85,325			x	85,325		Thermal Analysis	See Attachment 1
1015	CASK UNLOADING ROOM	CASK TRANSFER TROLLEY	. 1	1.00	1.00	5.0	HP	А	15,500			x	0		Mechanical Handling	See Attachment 6: air operated motor
1015	Cask Unloading Room													87,277		
1016	CTM MAINTENANCE ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	Х			437		ES&H	See Attachment 3
1016	CTM MAINTENANCE ROOM	CONTINUOUS AIR` MONITOR	8	1.00	1.00	43	Watts	N/A	147	х			1174	•	ES&H	See Attachment 3
1016	CTM MAINTENANCE ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	Х			341		I&C	See Attachment 4
1016	CTM MAINTENANCE ROOM								·············					1,952		
1017	CASK PREPARATION ROOM	AREA RADIATION MONITOR	12	1.00	1.00	16	Watts	N/A	55	х			655		ES&H	See Attachment 3
1017	CASK PREPARATION ROOM	CONTINUOUS AIR MONITOR	12	1.00	1.00	43	Watts	N/A	147	Х			1761		ES&H	See Attachment 3
1017	CASK PREPARATION ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	Х		,	341 .		1&C.	See Attachment 4
1017	CASK PREPARATION ROOM	CASK PREPARATION PLATFORM	1	0.45	1.00	(2) 10	НР	A	29,900 each		Х		6,728		Mechanical Handling	See Attachment 6 & Note 15
1017	CASK PREPARATION ROOM	CASK HANDLING CRANE (VFD) RATED: 200 TON	1	0.45	1.00	90	HP	A	254,600			x	28,642		Mechanical Handling	See Attachment 6 & Note 15Equip Load interpolated between 75 & 100 hp of Table 4.12 (Ref. 2.2.4)

Appendix E 120 December 2007

Room No.	Room Name	Heat Source Note 1	Qty . Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9			Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h	Originating Group/ Discipline	Remarks
1017	CASK PREPARATION ROOM	CASK HANDLING CRANE ASD	. 1	0.45	1.00	90	HP	Α	5374		х		604		Mechanical Handling	See Note 15
1017	CASK PREPARATION ROOM	TRANSPORTATION CASK WITH TAD ON RAIL CAR	1	1.00	1.00	25.0	KW	N/A	85,325			x	85,325	•	Waste Package	See Attachment 1
1017	CASK PREPARATION ROOM	CASK UNLOADING ROOM SHIELD DOOR	1	0.10	1.00	(2) 7.5	HP	A	22,700 each		X		1,135		Mechanical Handling	See Attachment 6 & Note 15
1017	CASK PREPARATION ROOM	MISC. EQUIPMENT	1	1.00	1.00				250,569	х			250,569		Mechanical Handling	See Note 16
1017	CASK PREPARATION ROOM													375,760		
1017A	CASK PREPARATION ANNEX	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	X			437	,	ES&H	See Attachment 3
1017A	CASK PREPARATION ANNEX	CONTINUOUS AIR MONITOR	- 8	1.00	1.00	43	Watts	N/A	147	х		-	1174		ES&H	See Attachment 3
1017A	CASK PREPARATION ANNEX	CASK PREP. ROOM EQUIP CONFINEMENT DOOR SOUTH	1	0.10	1.00	(2) 3	HP	A	9,430 each		×		472		Mechanical Handling	See Attachment 6 & Note 15
1017A	CASK PREPARATION ANNEX											***		2,083		
1018	ELECTRICAL ROOM (NORMAL POWER)	480 V LOAD CENTER	1	1.00	1.00	11.16	KW	N/A	38,089	х			38,089		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	480 V MCC 1A	1 ·	1.00	1.00	0.631	KW	N/A	2,154	х			2,154		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	480 V MCC 1B	1	1.00	1.00	0.631	KW	N/A	2,154	х		. 17	2,154		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	480 V MCC 1C	1	1.00	1.00	0.631	KW	N/A	2,154	х			2,154	_	Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	480 V MCC 1D	1	1.00	1.00	0.631	KW	N/A	2,154	х			2,154		Electrical	See Attachment 2
	ELECTRICAL ROOM (NORMAL POWER)	480 V MCC 1E	1	1.00	1.00	0.631	KW	N/A	2,154	х			2,154		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	480 V MCC 1F	1	1.00	1.00	0.631	KW	N/A	2,154	х			2,154		Electrical	See Attachment 2
	ELECTRICAL ROOM (NORMAL POWER)	LIGHTING PANEL	1	1.00	1.00	0.5	KW	N/A	1,707	х			1,707		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	LIGHTING PANEL	1	1.00	1.00	0.5	KW	N/A	1,707	х			1,707		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	75 KVA XFMR	1	1.00	1.00	2.695	KW	N/A	9,198	х			9,198		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	DISTRIBUTION PANEL	1	1.00	1.00	0.5	KW	N/A	1,707	х			1,707		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	75 KVA XFMR	1	1.00	1.00	2.695	KW	N/A	9,198	х			9,198		Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	DISTRIBUTION PANEL	1	1.00	1.00	0.5	кw	N/A	1,707	х			1,707		Electrical	See Attachment 2

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9	Intermitten Operation Note 10		Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originating Group/ Discipline	
1018	ELECTRICAL ROOM (NORMAL POWER)	DCMIS PANEL	1	1.00	1.00	0.4	ĸw	N/A	1,365	×			1,365	ā i	Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	DCMIS PANEL	1	1.00	1.00	0.4	кw	N/A	1,365	Х			1,365	:	Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	PLC PANELS	1	1.00	1.00	0.34	кw	N/A	1,160	х			1,160	·.	Electrical	See Attachment-2
1018	ELECTRICAL ROOM (NORMAL POWER)	PLC PANELS	1	1.00	1.00	0.34	KW	N/A	1,160	Х			1,160	*.	Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	UPS 05A	1	1.00	1.00	6.556	KW	N/A	22,376	х			22,376		Electrical	See Attachment 2
							7									
1018	ELECTRICAL ROOM (NORMAL POWER)	MAINTENANCE BYPASS XFMR (40 KVA)	1	1.00	1.00	0.5	KW	N/A	1,707	х			1,707	Ý	Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)	CABLE TRAY 36", 350'	1	1.00	1.00	3.78	KW	N/A	12,901	х			12,901	ı	Electrical	See Attachment 2
1018	ELECTRICAL ROOM (NORMAL POWER)		11 111 1											118,271		
1019	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	EXH-H EXHAUST FAN	1	1.00	1.00	200	HP	С	50,300	х			50,300	.	HVAC	See Attachment 5 and Assumption 3.1.22
1019	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	EXH-H EXHAUST FAN ASD	1	1.00	1.00	200	HP	С	10,426	х			10,426	:	HVAC	See Attachment 5 and Note 14
1019	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	х			437	;;	ES&H	See Attachment 3
	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	х			1,174	.4	ES&H	See Attachment 3
1010	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	RIO	1	1.00	1.00	100	Watts	N/A	341	х			341		I&C	See Attachment 4
1010	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)					·							-	62,678		
	HVAC ROOM (ITS HEPA EXHAUST FOR BATTERY ROOM TRAIN B)	200-VCTO-EXH-00011 EXHAUST FAN	1	1.00	1.00	15	НР	С	6,210	х			6,210		HVAC	See Attachment 5 and Assumption 3.1.22
	HVAC ROOM (ITS HEPA EXHAUST FOR BATTERY ROOM TRAIN B)	200-VCTO-EXH-00011 EXHAUST FAN ASD	1	1.00	1.00	15	HP	С	1,930	х	·	,	1,930		HVAC	See Attachment 5 and Note 14
1019A	HVAC ROOM (ITS HEPA	AREA RADIATION	8	1.00	1.00	16	Watts_	N/A	55	x			437		ES&H	See Attachment 3

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9	Intermittent Operation Note 10	Simultaneous Operation (Intermittent) Note 11	Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originating Group/ Discipline	Remarks
	EXHAUST FOR BATTERY ROOM TRAIN B)	MONITOR											:		:	
1019A	HVAC ROOM (ITS HEPA EXHAUST FOR BATTERY ROOM TRAIN B)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	Ņ/A	147	×			1,174		ES&H	See Attachment 3
1019A	HVAC ROOM (ITS HEPA EXHAUST FOR BATTERY ROOM TRAIN B)													9,751		
1029	ELEVATOR LOBBY	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	Watts	N/A	102	x			102		ES&H	See Attachment 3
1029	ELEVATOR LOBBY								· ·					102		
1212	RP GEAR SUPPLY ROOM	PC	4	1.00	1.00	30	Watts	N/A	102	X			410	-	ES&H	See Attachment 3
1215	RP EQUIPMENT ROOM	PC	4	1.00	1.00	30	Watts	N/A	102	X			410	:	ES&H	See Attachment 3
1216	RESPIRATOR ROOM	PC PC	1	1.00	1.00	30	Watts	N/A	102	Х			102	7	ES&H	See Attachment 3
1216	RESPIRATOR ROOM	RESPIRATOR DRYING EQUIPMENT	1	1.00	1.00	2,760	Watts	N/A	9,420		Х		0		ES&H	See Attachment 3
1216	RESPIRATOR ROOM	RESPIRATOR WASHING EQUIPMENT	1	1.00	1.00	2,760	Watts	N/A	9,420		x		0		ES&H	See Attachment 3
1217	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	5	1.00	1.00	30	Watts	N/A	102	x			512	,	ES&H	See Attachment 3
1218	RP LAB/COUNT ROOM	ALPHA SPECTOMETER	1	1.00	1.00	3	Watts	N/A	10	Х			10		ES&H	See Attachment 3
1218	RP LAB/COUNT ROOM	FRISKER STATION	2	1.00	1.00	0	Watts	N/A	0	X			0		ES&H	See Attachment 3
1218	RP LAB/COUNT ROOM	GAMMA SPECTOMETER	2	1.00	1.00	1,200	Watts	N/A	4,096	х			8,191		ES&H	See Attachment 3
1218	RP LAB/COUNT ROOM	LIQUID SCINTILATION COUNTER	1	1.00	1.00	1,230	Watts	N/A	4,198	x			4,198	. •	ES&H	See Attachment 3
1218	RP LAB/COUNT ROOM	PROPORTIONAL COUNTER	1	1.00	1.00	575	Watts	N/A	1,962	х			1,962	· · · · · · · · · · · · · · · · · · ·	ES&H	See Attachment 3
1218	RP LAB/COUNT ROOM	SWIPE COUNTER	2	1.00	1.00	575	Watts	N/A	1,962	X			3,925		ES&H	See Attachment 3
1219	RP LAB/SAMPLE PREPARATION ROOM	FRISKER STATION	1	1.00	1.00	0	Watts	N/A	0	Х			0		ES&H	See Attachment 3
1219	RP LAB/SAMPLE PREPARATION ROOM	SAMPLE PREPARATION HOOD	1	1.00	1.00	0	Watts	N/A	0	х			0		ES&H	See Attachment 3
1220	DECON ROOM	FRISKER STATION	2	1.00	1.00	0	Watts	N/A	0	X			0		ES&H	See Attachment 3
1223	GAS SAMPLING ROOM	200-M60-MREO-00101- 000	1	1.00	1.00	1	HP	А	3,390	x			3,390		Mechanical Process	See Attachment 5 and Assumption 3.1.22
1223	GAS SAMPLING ROOM	RIO -	1	1.00	1.00	100	Watts	· N/A	341	×			341		I&C	See Attachment 4; Room 1006 is now Room 1223
1223	GAS SAMPLING ROOM	FRISKER STATION	2	1.00	1.00	0	Watts	N/A	0	X			0		ES&H	See Attachment 3

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9	Intermitten Operation Note 10	Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originating Group/ Discipline	Remarks
1224	RP INSTRUMĖNT ROOM	ELECTRONIC DOSIMETER CALIBRATOR	1	1.00	1.00	1	Watts	N/A	3	×		3		ES&H	See Attachment 3
1224	RP INSTRUMENT ROOM	PC	2	1.00	1.00	30	Watts	N/A	102	х		205		ES&H	See Attachment 3
Support Area 1212 thru 1224	2												23,659		
1221	RA EXIT/ PCM ROOM	COMPUTER TERMINAL WALL DISPLAY	1	1.00	1.00	30	Watts	N/A	102	x		102	: 	ES&H	See Attachment 3
1221	RA EXIT/ PCM ROOM	FRISKER	1	1.00	1.00	0	Watts	N/A	0	Х		0		ES&H	See Attachment 3
1221	RA EXIT/ PCM ROOM	RADIATION AREA ACCESS CONTROL STATION	4	1.00	1.00	30	Watts	N/A	102	х		·410		ES&H	See Attachment 3
1221	RA EXIT/ PCM ROOM	SMALL EQUIPMENT MONITOR	1	1.00	1.00	30	Watts	N/A	102	X .		102		ES&H	See Attachment 3
1221	RA EXIT/ PCM ROOM	PERSONNEL PORTAL MONITOR	4	1.00	1.00	250	Watts	N/A	853	х		3,413		ES&H	See Attachment 3
1221	RA EXIT/ PCM ROOM			-									4,027		
2001	OPERATIONS/MAINTENANCE STTORAGE ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	х		341		1 & C	See Attachment 4
2001	OPERATIONS/MAINTENANCE STTORAGE ROOM												341		
2002A	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	Watts	N/A	102	x		102	·	ES&H	See Attachment 3
2002A	CORRIDOR												102		
2002B	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	3	1.00	1.00	30	Watts	N/A	102	×		307		ES&H	See Attachment 3
2002B	CORRIDOR						,			-			307		
2002C	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	Watts	N/A	102	х		102		ES&H	See Attachment 3
2002C	CORRIDOR												102		
2002E	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	5	1.00	1.00	30	Watts	N/A	102	×		512		ES&H	See Attachment 3
2002E	CORRIDOR												512		
2002F	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	Watts	N/A	102	X		102		ES&H	See Attachment 3
2002F	CORRIDOR												102		
2002G	CORRIDOR	RADIATION AREA	11	1.00	1.00	30	Watts	N/A	102	X		102		ES&H	See Attachment 3

Room No.	Room Name	Heat Source Note 1 ACCESS CONTROL	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9			Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originatin Group/ Discipline	1
2002G	CORRIDOR	STATION .							•					102		
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	х		·	437	1 .	ES&H	See Attachment 3
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	х			1,174		ES&H	See Attachment 3
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	RIO	1	1.00	1.00	100	Watts	N/A	341	х			341		I&C	See Attachment 4
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	AHU-C AIR HANDLING UNIT ASD	1	1.00	1.00	125	HP	С	6,982	х			6,982		HVAC	See Attachment 5 and Note 14
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	AHU-D AIR HANDLING UNIT ASD	1	1.00	1.00	125	HP	С	6,982	х			6,982		HVAC	See Attachment 5 and Note 14
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)													15,916		
2004	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	AREA RADIATION MONITOR	6	1.00	1.00	16	Watts	N/A	55	х			328	•	ES&H	See Attachment 3
2004	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	CONTINUOUS AIR MONITOR	6	1.00	1.00	43	Watts	N/A	147	х			881	,	ES&H	See Attachment 3
2004	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	RIO	í	1.00	1.00	100	Watts	N/A	341	х			341	,	1&C	See Attachment 4
2004	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	AHU-E AIR HANDLING UNIT ASD	1	1.00	1.00	125	HP	С	6,982	х			6,982	ţ	HVAC	See Attachment 5 and Note 14
2004	HVAC ROOM NORTH (PROCESS AREA SUPPLY)													8,532		
2005	INSTRUMENT AND ELECTRICAL SHOP	RIO	1	1.00	1.00	100	Watts	N/A	341	х			341	,	1&C	See Attachment 4
2005	INSTRUMENT AND ELECTRICAL SHOP													341		
2006	HVAC ROOM (HEPA EXHAUST FOR SUPPORT, DECON AND LLW AREAS)	AREA RADIATION MONITOR	10	1.00	1.00	16	Watts	N/A	55	×			546	-	ES&H	See Attachment 3
2006	HVAC ROOM (HEPA EXHAUST FOR SUPPORT, DECON AND LLW AREAS)	CONTINUOUS AIR MONITOR	10	1.00	1.00	43	Watts	N/A	147	x			1,468		ES&H	See Attachment 3
2006	HVAC ROOM (HEPA EXHAUST FOR SUPPORT, DECON AND LLW AREAS)	EXH-D & E EXHAUST FAN	2	1.00	1.00	75	HP	С	21,200	×			42,400		HVAC	See Attachment 5 and Assumption 3.1.22
2006	HVAC ROOM (HEPA EXHAUST FOR SUPPORT, DECON AND LLW AREAS)	EXH-D & E EXHAUST FAN ASD	2	1.00	1.00	75	HP	С	4,685	×			9370		HVAC	See Attachment 5 and Note 14
2006	HVAC ROOM (HEPA EXHAUST FOR SUPPORT, DECON AND LLW AREAS)													53,784		
2007	CANISTER TRANSFER ROOM	CTM MAINTENANCE	1	0.10	0.85	35	HP	Α	99,850		Х		2,122		Mechanical	See Attachment 6 &

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9	Intermittent Operation Note 10		Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originating Group/ Discipline	Remarks
		CRANE (VFD) RATED 15 TON												÷.	Handling	Note 15 -Equipment Load interpolated between 30 & 40 hp of Table 4.12 (Ref. 2.2.4)
2007	CANISTER TRANSFER ROOM	CTM MAINTENANCE CRANE ASD	1	0.10	0.85	35	HP	Α	2,849				61	,	Mechanical Handling	See Note 15
2007	CANISTER TRANSFER ROOM	CANISTER TRANSFER MACHINE (VFD): RATED: 450 TON	1	0.20	1.00	60	HP	А	172,000			x	8,600		Mechanical Handling	See Attachment 6
2007	CANISTER TRANSFER ROOM	CANISTER TRANSFER MACHINE ASD	. 1	0.20	1.00	60	HP	Α	3,996				200		Mechanical Handling	See Note 15
2007	CANISTER TRANSFER ROOM	CAST PORT SLIDE GATE	1	0.10	1.00	(2) 0.5	HP	Α	2,120 each		х		106		Mechanical Handling	See Attachment 6 & Note 15
2007	CANISTER TRANSFER ROOM	A/O/STC PORT SLIDE GATE	1	0.10	1.00	(2) 0.5	HP	Α	2,120 each		х		106		Mechanical Handling	See Attachment 6 & Note 15
2007	CANISTER TRANSFER ROOM	TAD	1	1.00	1.00	25.0	кw	N/A	85,325			х	85,325		Thermal Analysis	See Attachment 1
2007	CANISTER TRANSFER ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	×			437		ES&H	See Attachment 3
2007	CANISTER TRANSFER ROOM	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	х			1,174		ES&H	See Attachment 3
2007	CANISTER TRANSFER ROOM	RIO	1	1.00	1.00	100	Watts	N/A	341	Х			341		I&C	See Attachment 4
2007	CANISTER TRANSFER ROOM	MISC. EQUIPMENT	1	1.00	1.00				152,215	х			152,215		Mechanical Handling	See Note 16
2007	Canister Transfer Room													250,687		
2009	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	RIO	1	1.00	1.00	100	Watts	N/A	341	х			341		1&C	See Attachment 4
2009	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	AHU-F AIR HANDLING UNIT ASD	1	1.00	1.00	100	HP	С	5,834	х			5,834		HVAC	See Attachment 5 and Note 14
2009	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	,												6,175		
2010	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	х	-		437	•	ES&H	See Attachment 3
2010	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	х			1,174	•	ES&H	See Attachment 3
2010	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	RIO	1	1.00	1.00	100	Watts	N/A	341	х			341	·	I&C	See Attachment 4
2010	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	AHU-G AIR HANDLING UNIT ASD	1	1.00	1.00	100	HP	С	5,834	х	_		5,834		HVAC	See Attachment 5 and
	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	AHU-H AIR HANDLING UNIT ASD	1	1.00	1.00	75	HP	С	4,686	х			4,686		HVAC	See Attachment 5 and
2010	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)													12,472		
. 2011	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	AREA RADIATION MONITOR	8	1.00	1.00	16	Watts	N/A	55	х			437		ES&H	See Attachment 3

Room No.	Room Name	Heat Source Note 1	Qty . Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load, Each Note 5	Units Note 6	Motor Location Note 7	Equip Load Btu/h Note 8	Continuous Operation Note 9	Intermittent Operation Note 10	Simultaneous Operation (Intermittent) Note 11	Equip Load by Process Btu/hr Note 12	Equip Load USED, per Rm Btu/h Note 13	Originating Group/ Discipline	Remarks
2011	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	Watts	N/A	147	x			1,174		ES&H	See Attachment 3
2011	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	RIO	1	1.00	1.00	100	Watts	N/A	341	Х			341		1&C	See Attachment 4
2011	HVAC ROOM SOUTH (PROCESS AREA SUPPLY)	AHU-I AIR HANDLING UNIT ASD	1	1.00	1.00	75	HP	С	4,686	x			4,686		HVAC	See Attachment 5, and Assumption 3.1.22
2011	HVAC ROOM SOUTH (PROCESS AREA SUPPLY													6,638		
2012	RECIVER/DRYER EQUIPMENT ROOM	480V LOAD CENTER	1	1.00	1.00	7.1	кw	N/A	24,232	x	·		24,232	`	ELECTRIC AL	See Attachment 2
2012	RECIVER/DRYER EQUIPMENT ROOM	480V MCC	1	1.00	1.00	0.631	KW	N/A	2,154	x			2,154		ELECTRIC AL	See Attachment 2
2012	RECIVER/DRYER EQUIPMENT ROOM	480V MCC	1	1.00	1.00	0.631	KW	N/A	2,154	Х			2,154	ч	ELECTRIC AL	See Attachment 2
2012	RECIVER/DRYER EQUIPMENT ROOM	75 KVA XFMR	1	1.00	1.00	2.695	KW	N/A	9,198	х			9,198	• • • • • • • • • • • • • • • • • • • •	ELECTRIC AL	See Attachment 2
2012	RECIVER/DRYER EQUIPMENT ROOM	LIGHTING PANEL	1	1.00	1.00	0.5	KW	N/A	1,707	х			1,707		ELECTRIC AL	See Attachment 2
2012	RECIVER/DRYER EQUIPMENT ROOM	DISTRIBUTION PANEL	1	1.00	1.00	0.5	KW	N/A	1,707	х			1,707		ELECTRIC AL	See Attachment 2
2012	RECIVER/DRYER EQUIPMENT ROOM	CABLE TRAY 36", 350'	1	1.00	1.00	3.78	KW	N/A	12,901	х			12,901		ELECTRIC AL	See Attachment 2
2012	RECIVER/DRYER EQUIPMENT ROOM	REFRIG. AIR DRYER AIR-COOLED CONDENSER HEAT REJECTION	1	0.50	1.00	120,596	BTU/H	N/A	60,298			х	60,298		Mechanical Process	Reference 2.2.28 Assumption 3.1.23
	RECIVER/DRYER EQUIPMENT ROOM	IA DRYER PACKAGED	1	0.50	1.00	3	KW	N/A	5120			х	5,120		Mechanical Process	See Attachment 5
2012	RECIVER/DRYER EQUIPMENT ROOM	MISC. EQUIPMENT	1	1.00	1.00				954		·		954			
2012	RECIVER/DRYER EQUIPMENT ROOM													120,425		
2029	ELEVATOR LOBBY	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	Watts	N/A	102	×			102		ES&H	See Attachment 3
2029	ELEVATOR LOBBY													102		

Appendix E 127 December 2007

													Equip	Equip Load		-
				Use	Load	Heat Load,		Motor	Equip Load	Continuous		Simultaneous Operation		USED, per Rm	Originating	
Room		Heat Source	Qty.	Factor	Factor	Each	Units	Location				(Intermittent)		Btu/h	Group/	
No.	Room Name	Note 1	Note 2	Note 3	Note 4	Note 5	Note 6	Note 7	Note 8	Note 9	Note 10	Note 11	Note 12	Note 13	Discipline	Remarks

NOTES:

- 1. Description of equipment that gives up heat in a room.
- 2. Quantity of equipment in a room.
- 3. USE FACTOR means the approximate usage of equipment based on a 24 hour period.
- 4. LOAD FACTOR applies to equipment driven by electric motor such as Cranes, Trolleys and Site Transporter. The electric motor horsepower selection is based on the maximum capacity that the equipment can handle. In reality, these pieces of equipment are not lifting or pulling the maximum load all the time during a 24 hour period, therefore 85% load factor is a very conservative assumption.
- 5. Heat load that each equipment gives up into a room. Refer to next column for units (WATTS, KW or HP)
- 6. The conversion factor used to convert WATTS to Btu/hr is 3.413 and KW to Btu/hr is 3413. For HP, refer to Note 7.
- 7. Refer to Table 4.12 of ASHRAE Cooling and Heating-Load Calculation Manual (Reference 2.2.4) for location of motor and driven equipment with respect to conditioned space or airstream (A motor in, driven equipment in, B motor out, driven equipment in, C motor in, driven equipment out) and equivalent Btu/hr rating for listed motor hp.
- 8. Equipment heat load in Btu/hr
- 9. "Continuous Operation" means equipment is operating all the time 24 hour a day, heat load is constant.
- 10. "Intermittent Operation" means equipment is operating ON and OFF during a 24 hour period. The time of operation is not simultaneous with other equipment in a room which is also operating intermittently.
- 11. "Simultaneous Operation" means the equipment is also operating ON and OFF, but it operates at same time with other equipment which is also operating intermittently.
- 12. Heat load by an individual equipment based on the type of operation (continuous, intermittent or simultaneous).
- 13. The total equipment heat load per room (Obtained by adding all the equipment heat load in a room under the column "Equipment Load by Process"
- 14. Reference 2.2.25, Equation 34, p. 868
- 15. A 25% Diversity Factor is applied to the overall mechanical handling equipment (e.g. crane motors) heat gain per Attachment 9. (Example: Equip Load by Process = Use Factor x Load Factor x Equip Load X 0.25)
- 16. Miscellaneous Equipment are future additional load that are not known at this time. (See Assumption 3.1.24)
- 17. The brake horsepower for this exhaust fan increases from 5 to 5.65, however 5 brake horsepower was used in this calculation for this room only. The total heat load difference between 5 and 5.65 bhp is 252 Btu/h (approx. 7cfm) which is negligible.

Appendix E 128 December 2007

APPENDIX F: CALCULATED ROOF AND WALL COOLING LOADS

Tables F-1 and F-2 present the room-by-room roof and wall cooling load calculations, respectively, for the peak month and hour of each room.

Table F-1. Room-by-Room Calculated Roof Cooling Loads

Room No . Note 1	Room Name Note 1	Room Peak Mo/hr Note 2	Design Room Temp. °F Note 1	Roof Area ft ² Note 1	Roof Type Note 1	U-value of Roof Btu/h ft2 °F Note 1	Roof CLTD	CLTD Correction for Latitude And Month °F Note 5	K Color Correction Factor Note 6	CLTD Indoor Temperature Adjustment °F Note 7	CLTD Outdoor Temperature Adjustment °F Note 8	f-factor Note 9	Adjusted Roof CLTD °F Note 10	Calculated Roof Load Btu/h Note 11
1002	Lid Bolting Room	6/15	90	1,980	Type 12	0.031	29	2	11	-12	4.05	1	23.05	1,415
1003A	Corridor	6/15	82	0								·		0
1003B	Corridor	All	82	0										0
1003C	Corridor	6/15	82	0								:		0
1003D	Corridor	All	82	0						•:				0
1003E	Corridor	9/16	82	0										0
1003F	Corridor	9/15	82	0										0
1003G	Corridor	9/15	82	0										0.
1003H	Utility Chase	All	90	0	<u> </u>									0
1004	HVAC Room (ITS HEPA Exhaust Train A)	6/20	90	0										0
1004A	HVAC Room (ITS HEPA Exhaust for Battery Room Train A)	6/16	90	0	,									0
1012	LLW Staging Room	6/17	90	0										0
1013	Loading Room	All	100	0										0
1014	Maintenance Room	All	79	0			,							0
1015	Cask Unloading Room	All	100	0							:		·	0
1016	CTM Maintenance Room	All	90	0			*							0
1017	Cask Preparation Room	6/15	79	6,730	Type 12	0.031	29	2	1	-1 .	4.05	1	34.05	7,104
1017A	Cask Preparation Annex	9/19	79	0						•				0
1018	Electrical Room (Normal Power)	6/23	90	0										0
1018A	Battery Room (Normal Power)	9/21	77	0										0
1019	HVAC Room (ITS HEPA Exhaust Train B)	9/22	90	0										0
1019A	HVAC Room (ITS HEPA Exhaust for Battery Room Train B)	9/21	90	0.										0
1028	Freight Elevator	6/16	90	260	Type 1	0.065	74	2	1	-12	4.05	1 .	68.05	1,150
1029	Elevator Lobby	9/15	82	0										0
	Support Areas [Excluding Room 1221] (Assumption 3.1.20)	6/15	78	0						• .				0
1221 & 1205	Support Areas (Assumption 3.1.20)	6/15	78	670	Type 1	0.065	74	2	1	0	4.05	. 1	80.05	3,486
2001	Operations/Maintenance Storage Room	6/21	90	1,790	Type 12	0.031	29	2	1	-12	4.05	1	23.05	1,279
2002A	Corridor	6/15	82	0										0
2002B	Corridor	All	82	0										0
2002C	Corridor	All	82	0										0
2002D	Corridor	6/15	82	0										0
2002E	Corridor	All	82	0										0
2002F	Corridor	6/15	82	0										0

Appendix F 130 December 2007

Room No. Note 1	Room Name Note 1	Room Peak Mo/hr Note 2	Design Room Temp. °F Note 1	Roof Area ft ² Note 1	Roof Type Note 1	U-value of Roof Btu/h ft2 °F Note 1	Roof CLTD	CLTD Correction for Latitude And Month °F Note 5	K Color Correction Factor Note 6	CLTD Indoor Temperature Adjustment °F Note 7	CLTD Outdoor Temperature Adjustment °F Note 8	f-factor Note 9	Adjusted Roof CLTD °F Note 10	Calculated Roof Load Btu/h Note 11
2002G	Corridor	All	82	0				<u> </u>						0
2003	HVAC Room North (Process Area Supply)	6/16	90	4,840	Type 12	0.031	29	2	1	-12	4.05	1	23.05	3,458
2004	HVAC Room North (Process Area Supply)	6/16	90	3,170	Type 12	0.031	29	2	1	-12	4.05	1	23.05	2,265
2005	Instrument and Electrical Shop	6/18	90	4,290	Type 12	0.031	29	2 ·	1	-12	4.05	1	23.05	3,065
2006	HVAC Room (HEPA Exhaust for Support, Decon and LLW Areas)	6/17	90	3,180	Type 12	0.031	29	2	11	-12	4.05	1	23.05	2,272
2007	Canister Transfer Room	6/22	79	7,770	Type 12	0.031	29	2	11	1. <u>.</u> .	4.05	1	34.05	8,202
2009	HVAC Room South (Process Area Supply)	6/23	90	3,490	Type 12	0.031	29	2	1	-12	4.05	1	23.05	2,494
2010	HVAC Room South (Process Area Supply)	9/22	90	4,840	Type 12	0.031	29	-6.73	1	-12	4.05	1	14.32	2,149
2011	HVAC Room South (Process Area Supply)	9/22	90	3,170	Type 12	0.031	29	-6.73	1	-12	4.05	1	14.32	1,407
2012	Receiver/Dryer Equipment Room	9/21	90	4,290	Type 12	0.031	29	-6.73	1	-12	4.05	11	14.32	1,904
2029	Elevator Lobby	9/15	82	0										0
3001	Corridor	9/15	82	280	Type 1	0.065	74	-6.73	1	-4	4.05	1	67.32	1,225
3029	Elevator Lobby	6/15	82	0										0
R001	Firefight Elevator Machine Room	6/16	90	940	Type 1	0.065	74	2	1	-12	4.05	1	68.05	4,158
					•								Grand Total	47,033

NOTES:

- 1. From information and data contained in the Room Load Information Sheets in Appendix A. See the Room Load Information Sheets for additional remarks about the loads per room.
- 2. Determined using the Cooling and Heating Load Calculation Methodology on a room-by-room basis, outlined in Section 6.1.3. "All" means that the load is constant, room has no exterior exposure.
- 3. Not Used.
- 4. From Appendix B, Table B-1.
- 5. From Appendix B, Table B-2.
- 6. See Assumption 3.2.3.
- 7. Appendix B, From Equation B-1. The value equals 78 oF minus the design room temperature.
- 8. Appendix B, From Equation B-1. The value equals the average outside temperature on design day minus 85 oF, where the average outside temperature is 89.05 oF for 102 oF.
- 9. From Appendix B text and part of Equation B-1.
- 10. Using Equation B-1 with information from the previous columns.
- 11. Product of "Roof Area", "U-Value of Roof," and "Adjusted Roof CLTD." (Equation C-1)

Appendix F 131 December 2007

Table F-2. Room-by-Room Calculated Wall Cooling Loads

Down No.	Room Name	Room Peak Mo/hr	Design Room Temp. °F	Wall	U-value of Wall Btu/h ft2 °F	Wall Area ft²	Wall Group		CLTD Correction for Latitude And Month	K Color	CLTD Indoor Temperature Adjustment °F			Calculated Wall Load Btu/h	
Room No. Note 1	Note 1	Note 2	Note 1	Note 1	Note 1	Note 1	Note 1	Note 4	Note 5	Note 6	Note 7	Note 8	Note 9	Note 10	Note 11
1002	Lid Bolting Room	6/15	90	NW	0.22	2750	В	12	1.42	1	-12	4.05	5.47	3,309	3,309
1003A	Corridor	6/15	82	NE	0.22	130	В	18	1.42	1	-4	4.05	19.47	557	557
1003B	Corridor	All	82								,				0
1003C	Corridor	6/15	82	NE	0.22	110	В	18	1.42	1	-4	4.05	19.47	471	471
1003D	Corridor	All	82												0
1003E	Corridor	9/16	82	sw	0.113	150	G	63	3.58	1	-4	4.05	66.63	1,129	1,129
1003F	Corridor	9/15	82	SW	0.22	130	В	14	3.58	1	-4	4.05	17.63	504	504
1003G	Corridor	9/15	82	SW	0.22	100	В	14	3.58	1	-4	4.05	17.63	388	388
1003H	Utility Chase	All	90												0
1004	HVAC Room (ITS HEPA Exhaust Train A)	6/20	90	NE	0.22	1060	В	21	1.42	1	-12	4.05	14.47	3,374	3,374
1004A	HVAC Room (ITS HEPA Exhaust for Battery Room Train A)	6/16	90	NE	0.22	700	В	19	1.42	1	-12	4.05	12.47	1,920	1,920
1012	LLW Staging Room	6/17	90	NE	0.22	1380	В	19	1.42	11	-12	4.05	12.47	3,786	ļ
		6/17	90	NW	0.37	1410	В	13	1.42	1	-12	4.05	6.47	3,375	
														Total	7,161
1013	Loading Room	All	100												0
1014	Maintenance Room	All	79								+				0
1015	Cask Unloading Room	All	100												0
1016	CTM Maintenance Room	All	90												0
1017	Cask Preparation Room	6/15	79	SE	0.22	890	В	21	-0.85	1	-1	4.05	23.2	4,543	
		6/15	79	NE	0.22	730	В	18	1.42	1	-1	4.05	22.47	3,609	
		6/15	79	sw	0.22	730	В	14	-0.85	1	-1	4.05	16.2	2,602	
											<u> </u>			Total	10,753
1017A	Cask Preparation Annex	9/19	79	SE	0.22	670	В	26	3.58	1	-1	4.05	32.63	4,810	4,810
1018	Electrical Room (Normal Power)	6/23	90	SW	0.22	830	В	28	-0.85	1	-12	4.05	19.2	3,506	
		6/23	90	NW	0.22	1660	В	23	1.42	1	-12	4.05	16.47	6,015	
														Total	9,521
1018A	Battery Room (Normal Power)	9/21	77	SW	0.22	640	В	27	3.58	1	1	4.05	35.63	5,017	
		9/21	77	NW	0.22	170	В	21	-4.58	1	1	4.05	21.47	803	<u> </u>
													-	Total	5,820
1019	HVAC Room (ITS HEPA Exhaust Train B)	9/22	90	sw	0.22	1060	В	28	3.58	1	-12	4.05	23.63	5,511	5,511
1019A	HVAC Room (ITS HEPA Exhaust for Battery Room Train B)	9/21	90	SW	0.22	700	В	27	3.58	1	-12	4.05	22.63	3,485	3,485
1028	Freight Elevator	6/16	90	NW	0.113	1080	G	47	1.42	1	-12	4.05	40.47	4,939	<u> </u>
		6/16	90	SW	0.113	790	G	63	-0.85	1	-12	4.05	54.2	4,838	

Appendix F 132 December 2007

	<u> </u>					····						· · · · · · · · · · · · · · · · · · ·			
Room No. Note 1	Room Name Note 1	Room Peak Mo/hr Note 2 6/16	Design Room Temp. °F Note 1	Wall Orientation Note 1 NE	U-value of Wall Btu/h ft2 °F Note 1 0.113	Wall Area ft ² Note 1 470	Wall Group Note 1 G	Unadjusted Wall CLTD °F Note 4 26	CLTD Correction for Latitude And Month °F Note 5	K Color	CLTD Indoor Temperature Adjustment °F Note 7	CLTD Outdoor Temperature Adjustment °F Note 8 4.05	Adjusted Wall CLTD °F Note 9	Calculated Wall Load Btu/h Note 10	Total Wall Load Btu/h Note 11
														Total	10,811
1029	Elevator Lobby	9/15	82	sw	0.113	740	G	59	3.58	1	-4	4.05	62.63	5,237	5,237
1212 to 1224	Support Areas [Excluding Room 1221] (Assumption 3.1.20)	6/15	78	NE	0.22	1550	В	. 18	1.42	1	Ó	4.05	23.47	8,003	8,003
1221 & 1205	Support Areas (Assumption 3.1.20)	6/15	78												0
2001	Operations/Maintenance Storage Room	6/21	90	NE	0.22	1470	В	21	1.42	1	-12	4.05	14.47	4,680	~
		6/21	90	NW	0.22	1250	В	21	1.42	1	-12	4.05	14.47	3,979	·
				·						:				Total	8,659
2002A	Corridor	6/15	82	NE	0.22	130	В	18	1.42	1	-4	4.05	19.47	557	557
2002B	Corridor	All	82												0
2002C	Corridor	All	82									, , ,			0
2002D	Corridor	6/15	82	NE	0.113	140	G	27	1.42	1	-4	4.05	28.47	450	
		6/15	82	SW	0.113	140	G	59	-0.85	1	-4	4.05	58.2	921	
	. •									,				Total	1,371
2002E	Corridor	All	82	·				*							0
2002F	Corridor	6/15	82	NE	0.22	130	В	18	. 1.42	1	-4	4.05	19.47	557	557
2002G	Corridor	All	82												0
2003	HVAC Room North (Process Area Supply)	6/16	90	NE	0.22	1760	В	19	1.42	1	-12	4.05	12.47	4,828	4,828
2004	HVAC Room North (Process Area Supply)	6/16	90	NE	0.22	1250	В	19	1.42	1	-12	4.05	12.47	3,429	3,429
2005	Instrument and Electrical Shop	6/18	90	NE	0.22	1660	В	20	1.42	1	-12	4.05	13.47	4,919	
		6/18	90	SE	0.22	2070	В	25	-0.85	1	-12	4.05	16.2	7,377	
														Total	12,297
2006	HVAC Room (HEPA Exhaust for Support, Decon and LLW Areas)	6/17	90	NE	0.22	1380	В	19	1.42	. 1	-12	4.05	12.47	3,786	
	•	6/17	90	NW	0.37	2370	В	13	1.42	1	-12	4.05	6.47	5,674	
														Total	9,459
2007	Canister Transfer Room	6/22	79	NE	0.22	3780	В	21	1.42	11	-1	4.05	25.47	21,181	
		6/22	79	sw	0.22	3320	В	28	-0.85	1	-1	4.05	30.2	22,058	
		6/22	79	NW	0.22	2660	В	22	1.42	1	-1	4.05	26.47	15,490	
- W		6/22	79	SE	0.22	2070	В	26	-0.85	11	-1	4.05	28.2	12,842	
						•								Total	71,571
2009	HVAC Room South (Process Area Supply)	6/23	90	sw	0.22	1470	` В	28	-0.85	1	-12	4.05	19.2	6,209	
		6/23	90	NW	0.22	1820	В	23	1.42	11	-12	4.05	16.47	6,595	
·														Total	12,804

Appendix F 133 December 2007

Room No . Note 1	Room Name Note 1	Room Peak Mo/hr Note 2	Design Room Temp. °F Note 1	Wall Orientation Note 1	U-value of Wall Btu/h ft2 °F Note 1	Wall Area ft ² Note 1	Wall Group Note 1	Unadjusted Wall CLTD °F Note 4		K Color	Adjustment °F Note 7	CLTD Outdoor Temperature Adjustment °F Note 8	Adjusted Wall CLTD °F Note 9	Calculated Wall Load Btu/h Note 10	Total Wall Load Btu/h Note 11
2010	HVAC Room South (Process Area Supply)	9/22	90	SW	0.22	1760	В	28	3.58	1	-12	4.05	23.63	9,150	9,150
2011	HVAC Room South (Process Area Supply)	9/22	90	SW	0.22	1250	В	28	3.58	1	-12	4.05	23.63	6,498	6,498
2012	Receiver/Dryer Equipment Room	9/21	90	SW	0.22	1460	В	27	3.58	11	-12	4.05	22.63	7,269	
		9/21	90	SE	0.22	2300	В	26	3.58	1	-12	4.05	21.63	10,945	ļ
	·										•			Total	18,214
2029	Elevator Lobby	9/15	82	SW _	0.113	1060	G	59	3.58	1	-4	4.05	62.63	7,502	
	·	9/15	82	NW	0.113	290	G	37	-4.58	1 ·	-4	4.05	32.47	1,064	
														Total	8,566
3001	Corridor	9/15	82	SW	0.113	290	G	59	3.58	1	-4	4.05	62.63	2,052	
		9/15	82	SE	0.113	200	G	32	3.58	1	-4	4.05	35.63	805	
														Total	2,858
3029	Elevator Lobby	6/15	82	SW	0.113	400	G	59	-0.85	1	-4	4.05	58.2	2,631	
	,	6/15	82	NW	0.113	110	G	37	1.42	1	-4	4.05	38.47	478	
		6/15	82	SE	0.113	120	G	32	-0.85	1	-4	4.05	31.2	423	1
		6/15	82	NE	0.113	290	G	27	1.42	1	-4	4.05	28.47	933	
														Total	4,465
R001	Firefight Elevator Machine Room	6/16	90	NE	0.113	600	G	26	1.42	. 1	-12	4.05	19.47	1,320	
		6/16	90	SE	0.113	340	G	30	-0.85	1	-12	4.05	21.2	815	
		6/16	90	SW	0.113	460	G	63	-0.85	1	-12	4.05	54.2	2,817	1
	·	6/16	90	NW	0.113	340	G	47	1.42	1	-12	4.05	40.47	1,555	
														Total	6,507
											•			Grand Total	264,554

NOTES:

- 1. From information and data contained in the Room Load Information Sheets in Appendix A. See the Room Load Information Sheets for additional remarks about the loads per room.
- 2. Determined using the Cooling and Heating Load Calculation Methodology on a room-by-room basis, outlined in Section 6.1.3. "All" means that the load is constant, room has no exterior exposure.
- 3. Not Used.
- 4. From Appendix B, Table B-1.
- 5. From Appendix B, Table B-2.
- 6. See Assumption 3.2.3.
- 7. Appendix B, From Equation B-2. The value equals 78°F minus the design room temperature.
- 8. Appendix B, From Equation B-2. The value equals the average outside temperature on design day minus 85°F, where the average outside temperature is 89.05°F for 102°F.
- 9. Using Equation B-2 with information from the previous columns.
- 10. Product of "Wall Area," "U-Value of Wall," and "Adjusted Wall CLTD." (Equation C-2)
- 11. Sum of Calculated Wall Loads per room.

Appendix F 134 December 2007

APPENDIX G: CALCULATION OF THERMODYNAMIC PROPERTIES OF MOIST AIR

Table G-1. Thermodynamic Properties of Moist Air

	SYST	EM AHU-B ((AHU-00001	, 2 & 3) (Re	circulating	with Outside	e Air)		-
Description	Air Flow Cfm Note 1	Elevation ft. Note 2	Air Dry Bulb Temp. °F	Air Wet Bulb Temp. °F Note 3	Air Dew Point Temp. *F Note 3	Humidity Ratio W Ib water/Ib dry air Note 4	Specific Volume v cu. ft./lb dry air Note 3	Enthalpy h Btu/lb dry air Note 3	Density d Ib/cu. ft. Note 3
Supply Air Leaving Coil	53,500	3,310	· 51 Note 5	46.36	42.5	0.00645	14.7	19.23	0.068
Air Leaving Supply Fan / Entering the Coil	53,500	3,310	92.56 Note 6	62.05	42.5	0.00645	15.87	29.33	0.063
Return Air	38,320	3,310	80.45 Note 7	57.97	42.5	0.00645	15.52	26.39	0.064
Mixed Air Ent. Fan	53,500	3,310	86.56 Note 8	60.07	42.5	0.00645	15.70	27.87	0.064
Outside Air	15,180	3,310	102 Note 2	65	42.5	0.00645	16.15	31.63	0.062
	SYS.	TEM AHU-C	(AHU-0000	4 & 5) (Rec	irculating w	vith Outside	Air)		
Supply Air Leaving Coil	31,770	3,310	51 Note 5	46.36	42.5	0.00645	14.7	19.23	0.068
Air Leaving Supply Fan / Entering the Coil	31,770	3,310	95.96 Note 6	63.13	42.5	0.00645	15.97	30.15	0.063
Return Air	23,070	3,310	. 85.42 Note 7	59.69	42.5	0.00645	15.67	27.60	0.064
Mixed Air Ent. Fan	31,770	3,310	89.96 Note 8	61.20	42.5	0.00645	15.80	28.70	0.063
Outside Air	8,700	3,310	102 Note 2	65	42.5	0.00645	16.15	31.63	0.062
		SYSTEM A	HU-D (AH	J-00006 & 7	") (100% Ou	tside Air)		 	
Supply Air Leaving Coil	28,390	3,310	51 Note 5	46.36	42.5	0.00645	14.7	19.23	0.068
Air Leaving Supply Fan / Entering the Coil	28,390	3,310	108 Note 6	66.78	42.5	0.00645	16.32	33.08	0.061
Outside Air Ent. Fan	28,390	3,310	102 Note 2	65	42.5	0.00645	16.15	31.63	0.062

NOTES:

- 1. Taken from Table 5. Outside air is taken as the difference between the supply airflow and the return airflow.
- 2. Site elevation, see Section 6.1.1.
- 3. The thermodynamic properties of moist air are determined using psychrometric equations in Appendix D.
- 4. Assumption 3.1.11.
- 5. Assumption 3.1.5.
- 6. Air temperature entering fan plus 6°F (Assumption 3.1.6).
- 7. Mixed return air temperature from multiple rooms (individual airflow and temperature taken from Table 5), using equation D-13.
- 8. Mixed return/outside air temperature, using equation D-13.

APPENDIX H: INFILTRATION AIR COOLING LOAD CALCULATION (ROOM-BY-ROOM)

Table H-1. Infiltration Air Cooling Load

	INPL	JT DATA			1	1	SENSIBLE
Room No.	Room Name	Desig Outdoor °F	Adjacent Room	Room °F	Infiltration CFM	Constant 60 x 0.24 x 0.062 = 0.893	Infiltratior Load Btu/h
	Note 1	Note 2	Note 4	Note 1	Note 1	Note 5	Note 3
1002	Lid Bolting Room	102	_	90	910	0.893	9,752
1003A	Corridor	102	-	82	570	0.893	10,180
1003B	Corridor	102	-	82	0 .	0.893	0
1003C	Corridor	102	-	82	390	0.893	6,965
1003D	Corridor	102	-	82	0	0.893	0
· 1003E	Corridor	102	-	82	0	0.893	0
1003F .	Corridor	102	-	82	330	0.893	5,894
1003G	Corridor	102	-	82	590	0.893	10,537
1003H	Utility Chase	102	-	90	0	0.893	0
1004	HVAC Room (ITS HEPA Exhaust Train A)	102	-	90	30	0.893	321
1004A	HVAC Room (ITS HEPA Exhaust for Battery Room Train A)	102	-	90	70	0.893	750
1012	LLW Staging Room	102	-	90	430	0.893	4,608
1013	Loading Room	102	-	100	0	0.893	0
1014	Maintenance Room	102	-	79	0	0.893	0
1015	Cask Unloading Room	102	-	100	0	0.893	0
1016	CTM Maintenance Room	102	-	90	0	0.893	. 0
1017	Cask Preparation Room	102	-	79	1,160	0.893	23,825
1017A	Cask Preparation Annex	. 102	-	79	0	0.893	0
1018	Electrical Room (Normal Power)	102	•	90	60	0.893	643
1018A	Non ITS Battery Room	102	-	77	110	0.893	2,456
1019	HVAC Room (ITS HEPA Exhaust Train B)	102	·-	90	30	0.893	321
1019A	HVAC Room (ITS HEPA Exhaust for Battery Room Train B	102	-	90	70	0.893	750
1028	Freight Elevator	102	-	90	0	0.893	0
1029	Elevator Lobby	102	-	82	1,770	0.893	31,612
1212 to 1224	C2 Support (Excluding 1221, Assumption 3.1.20)	102	-	75	1,270	0.893	30,621
1221 &1205	C2 Support	102	-	75	0	0.893	0
2001	Operations/Maintenance Storage Room	102	<u> </u>	90	150	0.893	1,607
2002A	Corridor	102	-	82	340	0.893	6,072
2002B	Corridor	102	-	82	0	0.893	0
2002C	Corridor	102	-	82	0	0.893	0
2002D	Corridor	102	-	82	2,000	0.893	35,720

	. INF	PUT DATA					SENSIBLE
		Desig	ın Temperat	ure			
Room No.	Room Name	Outdoor °F	Adjacent Room °F	Room °F	Infiltration . CFM	Constant 60 x 0.24 x 0.062 = 0.893	Infiltration Load Btu/h
	Note 1	Note 2	Note 4	Note 1	Note 1	Note 5	Note 3
2002E	Corridor	102	-	82	0	0.893	0
2002F	SW Corridor	102	-	82	340	0.893	6,072
2002G	Corridor	102	-	82	0	0.893	0
2003	HVAC Room North (Process Area Supply)	102	-	90	150	0.893	1,607
2004	HVAC Room North (Process Area Supply)	102	-	90	110	0.893	1,179
2005	Instrument and Electrical Shop	102	-	90	240	0.893	2,572
2006	HVAC Room (HEPA Exhaust for Support, Decon and LLW Areas)	102	-	90	510	0.893	5,465
2007	Canister Transfer Rm	102	-	79	100	0.893	2,054
2009	HVAC Room South (Process Area Supply)	102	-	90	190	0.893	2,036
2010	HVAC Room South (Process Area Supply)	102	- .	90	150	0.893	1,607
2011	HVAC Room South (Process Area Supply)	102	-	90	110	0.893	1,179
2012	Receiver /Dryer Equipment Room	102	-	90	240	0.893	2,572
2029	Elevator Lobby	102	-	82	1,170	0.893	20,896
3001	Corridor	102	-	82	210	0.893	3,751
3029	Elevator Lobby	102	-	82	1,110	0.893	19,825
R001	Freight Elevator Machine Room	102	-	90	0	0.893	0
Total	s		-		14,910		253,451

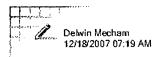
NOTES:

- 1. Obtained from the Room Load Information Sheets in Appendix A
- 2. Outdoor dry bulb design temperature, Section 6.1.1
- 3. Infiltration loads are calculated using Equation C-15 from Appendix C, where input data comes from the Room Load Information Sheets in Appendix A.
- 4. This information is not used in the calculation of the infiltration loads
- 5. Constant based on Density of Air at 3310 ft. altitude (0.062 lbs./cu. ft.), Refer to Appendix D for the appropriate equations to calculate air density

ATTACHMENT 1: EMAIL REGARDING WASTE PACKAGES AND CANISTERS HEAT GAIN INFORMATION

(2 pages)

This e-mail is from Delwin Mecham of BSC Thermal Analysis, dated 12/18/07, to Greg Gould of the BSC Mechanical HVAC Group. It confirms the use of Waste Cask heat load in the RF as an assumption requiring verification.



To:

Greg Gould/YM/RWDOE@CRWMS :

OC:

Subject: Re: Fw: HVAC Heat Load input

LSN; Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA;N/A

Based on the following, I suggest the surface design HVAC to the following heat loads:

TAD

25 kW each

DOE canisters

1.5 kW each

Naval canisters

11.8 kW each

Waste Packages

18 kW to 25 kW each

Total heat load per room will depend on number of items per room.

TAD 25 kW based on the range in the TAD draft specification, also Thermal Management Study Section 3.4. (DIRS 172739). There really is no limit, it is whatever the vendors design, but 30 kW should be bounding, 22 kW is more likely.

WP 18.0 kW based on pending TMRB decision (TMRB 2007-084), but better use 25 kW to meet potential changes in drift thermal requirements.

DOE canister 1500 watts REF: [DIRS 176668] "Request for Updated U.S. Department of Energy (DOE) Canister Thermal Output Limits in Support of Repository Design (EM-FMDP-06-006)." Memorandum from M.R. Arenaz (DOE) to W.J. Arthur, III (DOE/ORD), February 6, 2006, 0210065322, with enclosures. ACC: MOL 20060315.0141.

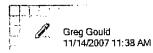
Naval canister 11.8 kW REF: Section 11 of [DIRS 165219] Naval Nuclear Propulsion Program Technical Baseline Compliance Document, Revision 1, October 2002. Letter from J.M. McKenzie (DOE) to J. Williams (DOE/OCRWM)

ATTACHMENT 2: E-MAIL REGARDING RF ELECTRICAL EQUIPMENT HEAT GAIN INFORMATION

(5 pages)

This e-mail is from Arsenio Mendiola of the BSC Electrical Group to Tracy Johnson of the BSC Mechanical HVAC Group, and then forwarded to Greg Gould of the BSC Mechanical HVAC Group. It confirms the electrical heat load in the RF Electrical Room (Normal Power).

There are seven files attached to the e-mail. Three pertain to different facilities and the one that pertains to the RF ITS Electrical Room is not applicable to this calculation. Only the file that contains information on the RF Electrical Room 1018 (Normal Power) and Room 2012 are shown and deemed pertinent to this calculation.



To:

Monico Pingul/YWRWDOE@CRWMS, Elpidio Castroverde/YWRWDOE@CRWMS, Gin Cababa/YWRWDOE@CRWMS, Fred Favis/YWRWDOE@CRWMS, Orlando SantiagoYYMRWDOE@CRWMS, Jerry Herszman/YWRWDOE@CRWMS, Hang YangYM/RWDOE@CRWMS, Oscar Rosales/YM/RWDOE@CRWMS, Ricardo Abraham/YWRWDOE@CRWMS, Orlando Asuncion/YWRWDOE@CRWMS, Francis Banea/YM/RWDOE@CRWMS

Subject: Fw: Heat Loss update

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

FYI.

--- Forwarded by Greg Gould/YM/RWDDE on 11/14/2007 11:37 AM -----

P Arsenio Mendiola 11/14/2007 11:33 AM

To:

Tracy Johnson/YMRWDOE@CRWMS
Debra Nevergold/YMRWDOE@CRWMS, David Tooker/YMRWDOE@CRWMS, Roshellia
Goines/YMRWDOE@CRWMS, Hadi Jalali/YM/RWDOE@CRWMS, Greg Gould/YWRWDOE@CRWMS,
Robert Slovic/YMRWDOE@CRWMS, Muhammad N Islam/YMRWDOE@CRWMS

Subject: Heat Loss update

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Attached below are the estimated heat losses for nuclear facilities.

Regards, Arsenio

- Forwarded by Arsenio Mendiola/YM/RWD OE on 11/14/2007 10:58 AM -----



Muhammad Nislam 11/14/2007 10:08 AM

To:

Arsenio Mendiola/YWRWDOE@CRWMS Amendo de la Cruz/YM/RWDOE@CRWMS

Subject: Heat Loads Updated

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Incorporated your comments.









CRCF Heat Loads.xls Heat loss for RF (normal).xls Heat loss for RF ITS Train B.xls Heat loss for RF ITS TrainA.xls







Heat loss for RF ROOM 2012.xls IHF Heat Loads.xls WHF Heat Loads 1.xls

Attachment 2 – Print of Attached File, Normal RF.xls

	G FACILITY (RF) EAT LOSS ESTIMATE (PRELIMINARY)			
	DAT BOSS ESTIMATE (TRESIMITART)			
ELECTRICAL EQUIPMENT	HEAT LOSS IN KW	EQUIPMENT NUMBI		
480 V Load Center	11,160	200-EEN0-LC-00001		
480 V MCC	. 0.631	200-EEN0-MCC-0000		
480 V MCC	0.631	200-EEND-MCC-0000		
480 V MCC	0.631	200-EEND-MCC-0000		
480 V MCC	.0.631	200-EEND-MCC-0000		
480 V MCC	0.631	200-EEN0-MCC-0000		
430 V MCC	0.631 .	200-EEN0:MCC-0000		
Lighting Panel	0.500	200-EU1:0-PL-00001		
Lighting Panel	0.500	200-EULO-PL-0000		
75 kVA XFMR	2,695	200-EENO-XFMR-00		
Distribution Panel	0.500	200-EENO-PL-00004		
75 kV A XFMR	2.695	200-EENO-XFMR-000		
Distribution Panel	0.500	200-EENO-PL-00003		
DCMIS Panel	0,400			
DCMIS Panel	0.400			
PLC Panels	.0.340			
PLC Panels	0:340			
UPS OSA	6.556	200-EEPO-UJX-0000		
Maintenance;Bypase XFMR (40 kVA)	10,500	200-EEPO-XFMR-0000		
'Cabte Tray 36', 350'	.3.780			
Total in kW	34.652	,		

Attachment 2 - Print of Attached File, Normal RF.xls

RF HANDL	ING FACILITY (RF)	
ELECTRICAL ROOM 2012 (Norma	I) HEAT LOSS ESTIMATE (PRELIMINARY)	
ELECTRICAL EQUIPMENT	HEAT LOSS IN KW	EQUIPMENT NUMBER
480 V Load Center	7.1	200-EEN0-LC-00002
480 V MCC	0.631	200-EEN0-MCC-00007
480 V MCC	0.631	200-EEN0-MCC-00008
Lighting Panel	0.5	200-EUL0-PL-00007
75 kVA XFMR	2.695	200-EEN0-XFMR-00005
Distribution Panel	0,5	200-EEN0-PL-00005
Cable Tray 36", 350'	3.78	
Total in kW	15.837	

ATTACHMENT 3: E-MAIL REGARDING ENVIRONMENTAL, SAFETY & HEALTH EQUIPMENT HEAT GAIN INFORMATION

(12 pages)

This e-mail is from Thomas Bastian of the BSC Environmental, Safety And Health Group, dated 6/20/07, to Ricardo Abraham of the BSC Mechanical HVAC Group. It confirms the heat loads of various pieces of equipment located throughout the RF.

Ricardo Abraham 07/09/2007 07:58 AM

To:

Clayton De Losier/YM/RWDOE@CRWMS

Subject: Fw. HVAC Heat Gain Information for RF Facility

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

FYI

------ Forwarded by Ricardo Abraham/YM/RWDOE on 07/09/2007 08:02 AM ------------

Thomas Bastian

06/20/2007 02:43 PM

Ricardó Abraham/YM/RWDÓE@CRWMS

cc: Gregory Eadler/M/RWDOE@CRWMS, Stacy Junio/YM/RWDOE@CRWMS Subject: Re: HVAC Heat Gain Information for RF Facility 19

LSN: Not Relevant - Not Privileged User Filed as; Excl/AdminMgmt-14-4/QA:N/A

Ricardo,

I have attached the file containing an estimate of the heat producing radiation protection

I will be out of the office until 6/25: I can answer any questions when I return.

Tom

RP Equipment Load List RF (06-25-07) xls

Ricardo Abraham



Ricardo Abraham 06/15/2007 03:18 PM

Thomas Bastian/YM/RWD0E@CRWMS

Oscar RosalesYM/RWDOE@CRWMS, Tracy Johnson/YM/RWDOE@CRWMS

Subject: HVAC Heat Gain Information for RF Facility

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Tom,

I'm doing the HVAC cooling load calculation for the RF facility (C2) areas. Please provide the ES&Hequipment list, location, and load that will be release to the rooms for all the equipment that you are using for the RF facility

Attached is our standard form that you might want to use for listing the equipment.

Thanks,

Ricardo

EqupHtGainListForm.xls

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Use Factor Note 3	Load Factor Note 4	Heat Load Note 5	Units Note 6	Motor Location Type Note 7	Equip Load Btu/hr Note 8	Continuous Operation Note 9	Intermittent Operation Note 10	Simultaneous Operation (Intermittant) Note 11	Equipment Load by Process Btu/h Note 12	Process Note 13	Equip Load USED, per RM Btu/h Note 14	Originating Group/ Discipline	Remarks
1001		AREA RADIATION MONITOR	. 8	1.00	1.00	16	WATTS		55	×						ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1002	LID BOLTING ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS		55	X						ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
. 1002	SITE TRANSPORTER VESTIBULE	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS		147	x						ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1002	LID BOLTING ROOM	CONTINUOUS AIR MONITOR	8.	1.00	1.00	43	WATTS		147	х					The state of the s	ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1004	HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS		55	x					and the second of the second o	ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1004		CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS		147	x						ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1011		AREA RADIATION MONITOR	4	1.00	1.00	16	WATTS		55	x						ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1011		CONTINUOUS AIR MONITOR	4	1.00	1.00	43	WATTS	•	147	X						ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1012	LLW STAGING ROOM	AREA RADIATION MONITOR	10	1.00	1.00	16	WATTS		55	x		·				ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR

1012	LLW STAGING ROOM	CONTINUOUS AIR MONITOR	10	1.00	1.00	43	WATTS	147	x					ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1012	LLW STAGING ROOM ENTRANCE	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS	102	x					ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1013	LOADING ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS	55	x	·				ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1013	LOADING ROOM	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS	147	х					ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1015	CASK UNLOADING ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS	55	х					ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1015	CASK UNLOADING ROOM	CONTINUOUS AIR- MONITOR	8	1.00	1.00	43	WATTS	147	х					ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1016	CTM MAINTENANCE ROOM	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS	55	х				Ann 10 T	ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1016	CTM MAINTENANCE ROOM	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS	147	х				en deservit de la constant de la con	ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1017	CASK PREPARATION ROOM	AREA RADIATION MONITOR	12	.1.00	1.00	16	WATTS	55	х			7.7		ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1017	CASK PREPARATION ROOM	CONTINUOUS AIR MONITOR	12	1.00	1.00	43	WATTS	147	х					ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1019	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	AREA RADIATION MONITOR	. 8	1.00	1.00	16	WATTS	55	х					ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR

1019	HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS		147	х			ES&		BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1021		AREA RADIATION MONITOR	4	1.00	1.00	16	WATTS		-55	X			ES&	н	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
	TRANSPORTATION CASK VESIBULE ANNEX	CONTINUOUS AIR MONITOR	4	1.00	1.00	43	WATTS		147	х			ES&ł	H.	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1029		RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS		102	, x			ES&	HĴ.	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1203	RA CONTROL POINT	BAR CODE SCANNER	1	1.00	1.00	0			0	х			ES&	-1	ASSUME NO HEAT LOAD
1203	RA CONTROL POINT	PC	2	1.00	1.00	30	WATTS		102	x			ES&I	۱	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1203	RA CONTROL POINT	RADIATION AREA ACCESS CONTROL STATION	4	1.00	1:00	30	WATTS	-	102	X	·		ES&I	1.	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH; MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1207	OPERATIONS ROOM	DISPLAY BOARD	10	1.00	1:00	30	WATTS		102	x			ES&+	4.	ASSUME 1 PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8 (BASED ON NO. OF WORKSTATION ON PLAN)
1209	RP STAFF WORK ROOM	DISPLAY BOARD	1	1.00	1.00	30	WATTS		102	X			ES&	1 '	ASSUME 1 PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8 (BASED ON NO. OF WORKSTATION ON PLAN)

1209	RP STAFF WORK ROOM	PC	4 .	1.00	1.00	30	WATTS		102	х			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1212	RP GEAR SUPPLY ROOM	PC	4	1.00	1.00	30	WATTS	·	102	х	·		ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1215	RP EQUIPMENT ROOM	PC	4	1.00	1.00	30	WATTS		102	х			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1216	RESPIRATOR ROOM	PC	1	1.00	1.00	30	WATTS		102	x			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1216	RESPIRATOR ROOM	RESPIRATOR DRYING EQUIPMENT	1	1:00	1.00	2760	WATTS		9,420		×		ES&H	BASED ON AMERICAN AIRWORKS GS1500 RESPIRATOR DRYER
1216	RESPIRATOR ROOM	RESPIRATOR WASHING EQUIPMENT	1	1.00	1.00	2760	WATTS		9,420		x		ES&H	BASED ON AMERICAN AIRWORKS GS4800 RESPIRATOR WASHER
1217	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	5	1.00	1.00	30	WATTS		102	. x			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30.
1218	RP LAB/COUNT ROOM	ALPHA SPECTOMETER	1	1.00	1.00	3	WATTS	and the second s	10	x			ES&H	ASSUME POWER REQUIREMENTS OF 3 WATTS FOR CANBERRA MODEL 7401 ALPHA SPECTOMETER
1218	RP LAB/COUNT ROOM	FRISKER STATION	2	1.00	1,00	0			0	x			ES&H	ASSUME NO HEAT LOAD

						·									
1218	RP LAB/COUNT ROOM	GAMMA SPECTOMETER	2	1.00	1.00	1200	WATTS		4,096	x		·		ES&H	ASSUME POWER REQUIREMENTS OF 1200 WATTS FOR CANBERRA, GAM- AN1 GAMMA SPECTOMETER
1218	RP LAB/COUNT ROOM	LIQUID. SCINTILATION COUNTER	1	1.00	1.00	1230	WATTS		4,198	X				ES&H	ASSUME POWER REQUIREMENTS OF 1230 WATTS FOR BECKMAN COULTER, MODEL 6500 SCINTILATION COUNTING SYSTEM
1218	RP LAB/COUNT ROOM	PROPORTIONAL COUNTER	1	1.00	1.00	575	WATTS	·	1,962	Х .				ES&Ĥ	ASSUME POWER REQUIREMENTS OF 575 WATTS FOR TENNELEC LB4100, MULTI- DETECTOR COUNTING SYSTEM
1218	RP LAB/COUNT ROOM	SWIPE COUNTER	2	1.00	1.00	575	WATTS		1,962	x				ES&H	ASSUME POWER REQUIREMENTS OF 575 WATTS FOR TENNELE LB4100, MULTI- DETECTOR COUNTING SYSTEM
1219	RP LAB/SAMPLE PREPARATION ROOM	FRISKER STATION	1	1.00	1.00	0			0	х				ES&H	ASSUME NO HEAT LOAD
1219	RP LAB/SAMPLE	SAMPLE PREPARATION HOOD	1	1.00	1.00	0			0	X				ES&H	ASSUME EXHAUST FAN MOTOR IS EXTERNAL TO BUILDING
1220	DECON ROOM	FRISKER STATION	2	1.00	1.00	0		-	0	. x				ES&H	ASSUME NO HEAT LOAD
1221	RA EXIT/ PCM ROOM	COMPUTER TERMINAL WALL DISPLAY	1	1.00	1.00	30	WATTS		102	x			·	ES&H	ASSUME 1 PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
. 1221	RA EXIT/ PCM ROOM	FRISKER	1	1.00	1.00	0			0	х				ES&H	ASSUME NO HEAT LOAD
1221	RA EXIT/ PCM ROOM	RADIATION AREA ACCESS CONTROL STATION	4			30	WATTS		102	x				ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8

		 						 						
122	RA EXIT/ PCM ROOM	SMALL EQUIPMENT MONITOR	1	1.00	1.00	30	WATTS	102	X				ES&H	ASSUME 1 PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
122	RA EXIT/ PCM ROOM	PERSONNEL PORTAL MONITOR	4	1.00	1.00	250	WATTS	853	x	·			ES&H	BASED ON THERMO EBERLINE PCM-2 WHOLE BODY CONTAMINATION MONITOR
1223	GAS SAMPLING ROOM	FRISKER STATION	2	1.00	1.00	0		0	х				ES&H	ASSUME NO HEAT LOAD
1224	HP INSTRUMENT ROOM	ELECTRONIC DOSIMETER CALIBRATOR	1	1.00-	1.00	1	WATTS	3	х				ES&H	ASSUME 0.9 WATTS POWER CONSUMPTION FOR GDS MODEL LDM220
1224	HP INSTRUMENT ROOM	PC	2	1.00	1.00	30	WATTS	102	х			•	ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS	55	х				ES8H	BASED ON CANBERRA ADM608M MULTI-PURPOSE RADIATION MONITOR
2003	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS	147	x				ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
2004	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	AREA RADIATION MONITOR	6	1.00	1.00	16	WATTS	55	х				ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
2004	HVAC ROOM NORTH (PROCESS AREA SUPPLY)	CONTINUOUS AIR MONITOR	6	1.00	1.00	43	WATTS	147	x				ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
2006		AREA RADIATION MONITOR	10	1.00	1.00	16	WATTS	55	х				ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
2006		CONTINUOUS AIR MONITOR	10	1.00	1.00	43	WATTS	147	х				ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM

2007	CANISTER TRANSFER ROOM	AREA RADIATION MONITOR	. 8	1.00	1.00	16	WATTS		55	х			ES&H	BASED ON CANBERRA ADM60SM MULTI-PURPOSE RADIATION MONITOR
2007	CANISTER TRANSFER ROOM	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS		147	х			ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
2010		AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS		55	х			ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
		CONTINUOUS AIR MONITOR	8	1.00	1,00	43	WATTS		147	х			ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
2011		AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS		-55	x			ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
2011		CONTINUOUS AIR MONITOR	8	1,00	1.00	43	WATTS		147	х			ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
2023	STAIR#2	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS		102	x			E\$&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2027	STAIR#5	RADIATION AREA ACCESS CONTROL STATION	5	1.90	1.00	30	WATTS		102	x		·	ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2029	ELEVATOR LOBBY	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS	•	102	х			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1003A	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	3	1.00	1.00	30	WATTS	-	102	x			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8

	·				,			,			 ·		 		
1003B	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	2	1.00	1.00	30	WATTS		102	X		·		ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1003E	CORRIDOR	RADIATION AREA ACCESS . CONTROL STATION	1	1.00	1.00	30	WATTS		102	Х				ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1003F	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	2	1.00	1.00	30	WATTS		102	х				ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1003G	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	3	1.00	1.00	30	WATTS		102	x				ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
1004A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN A)	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS		55	х				ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1004A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN A)	CONTINUOUS AIR MONITOR	8	1.00	1.00	150	WATTS		.512	х				ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND 3/4 HP VACUUM PUMP MOTOR
1017A		AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS		55	х				ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR
1017A	CASK PREPARATION ROOM ANNEX	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WAŢTS		147	x				ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
1019A	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN B)	AREA RADIATION MONITOR	8	1.00	1.00	16	WATTS		55	x				ES&H	BASED ON CANBERRA ADM606M MULTI-PURPOSE RADIATION MONITOR

1	HVAC ROOM (ITS HEPA EXHAUST BATTERY ROOM FOR TRAIN B)	CONTINUOUS AIR MONITOR	8	1.00	1.00	43	WATTS		147	x			ES&H	BASED ON CANBERRA ICAM ALPHA/BETA AIR MONITOR AND USE OF FACILITY VACUUM SYSTEM
2002A	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS		102	×			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2002B	CORRIDOR	RADIATION AREA ACCESS . CONTROL STATION	3	1.00	1.00	30	WATTS	·	102	x			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2002C	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS		102	x			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2002E	CORRIDOR	RADIATION AREA ACCESS - CONTROL STATION	5	1.00	1.00	30	WATTS		102	×			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2002F	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS		102	x			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8
2002G	CORRIDOR	RADIATION AREA ACCESS CONTROL STATION	1	1.00	1.00	30	WATTS		102	x			ES&H	ASSUME AS PC IN ENERGY SAVE MODE AT 30 WATTS EACH, MONITOR AT 0 WATTS PER ASHRAE (2005) CH. 30, TABLE 8

- Description of equipment giving heat to the room
- . Quantity of equipment in the room.
- ''Use Factor' means the approximate usage of equipment based on a 24 hour period.
 ''Load Factor'' applies to equipment driven by electric motor such as Cranes, Trolleys and Site Transporter. The electric motor horsepower selection is based on the maximum capacity that the equipment can handle. In reality, these pieces of equipment are not litting or pulling the maximum load all the time during a 24 hour period, nerefore 85% load factor is a very conservative assumption.
- . Heat load that each equipment gives up into a room. Refer to next column for units (Watts, kW or HP)
- The conversion factor used to convert Watts to Btu/h is 3.413 and kW to Btu/h is 3413. For HP conversion, refer to Note 7.
- . Refer to Table 4.12 of ASHRAE Cooling and Heating Load Calculation Manual (Reference 2.2.4) for location of motor and driven equipment with respect to conditioned space or airstream (A motor in, driven equipment in, C motor in, driven equipment out) and equivalent Blu/n rating for listed
- . Equipment heat load in Btu/hr.
- 9. "Continuous Operation" means equipment is operating all the time 24 hour a day, heat load is constant..
 10. "Intermittent Operation" means equipment is operating ON and OFF during a 24 hour period. The time of operation is not simultaneous with other equipment in a room which is also operating intermittently.
 11. "Simultaneous Operation" means the equipment is also operating ON and OFF, but it operates at the same time with other equipment which is also operating intermittently.
- 12. Heat load by an individual piece of equipment based on the type of operation (continuous, intermittent or simultaneous):
- 13. Most of the equipment listed in this table operates intermittently. There are certain types of work when an appropriate piece of equipment is used to handle that particular job. The process that utilizes the most equipment working simultaneously represents the highest heat load. That figure is used as the room equipment heat load. When numbers are shown (1,2,3 etc.) they represents the number of scenarios where equipment works
- simultaneously with the other equipment. The type of work that utilizes the most equipment represents the highest heat load and it is the figure used as the room equipment heat load.
- 14. The total equipment heat load per room obtained by adding all the equipment heat load in a room under the column "Equipment Load by Process",

ATTACHMENT 4: E-MAIL REGARDING INSTRUMENTATION AND CONTROLS EQUIPMENT HEAT GAIN INFORMATION

(4 pages)

This attachment contains an e-mail from Lino Salgado of the BSC Instrumentation and Controls Group, dated 6/20/2007, to Ricardo Abraham of the BSC Mechanical HVAC Group. It confirms the locations and heat gains of various instrumentation and controls equipment located throughout the RF.



· To: cc:

Clayton De Losier/YM/RV/DOE@CRV/MS

Subject: Fw. HVAC Heat Gain Information for RF Facility

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

FYI

----- Figwarded by Ricardo Abraham //M/RVADOE on 07/09/2007 07:59 AM ------



Lino Salgado 06/20/2007 10:17 AM

To:

Ricardo Abrahamy M/RWDOE@CRWMS Steve Schmudery M/RWDOE@CRWMS, Oscar Rosalesy M/RWDOE@CRWMS, Tracy Johnson/YM/RWDOE@CRWMS

cc:

Subject: Re: HVAC Heat Gain Information for RF Facility 19

LSN: Not Relevant

User Filed as: Not a Record

Heat gain information for Rf Facility per your request:



RF Heat Load List(C&I).xls

Lino 1-8635

Attachment 4 - Print of File, RF Heat Load List (C&I).xls

RF Heat Load List

Room No.	Conf. Zoning C or NC	Area	Room Name	Heat Source	Qty.	Heat Load/Eq ulpment (Watts)	Motor Location Type	Total Equip Load (Btu/hr)	Continuous Operation	Intermittent Operation	Simultaneous Operation	Indoor Design Temp	Reference Document	Originating Group/ Discipline	Contact Person	Remarks
1001			Site Transport Vestibule	Remote I/O (RIO)	1	100		341					Delta V product data sheet (typical for all RIOs)	:		
1002			Lid Bolting Room	RIO	1	100		341								
1004			HVAC Room (ITS HEPA Exhaust Train A)	RIO	1	100		341								
			Exhaust Haili A)	DCMIS I/O Cabinet	1	1000		3413								
1005			Electrical Room (ITS Train A)	PLC	1	350		1195					Triconex Corporation Topical Reports 7286-545 "Qualification Summary Report"			Assumed 2 power supplies per PLC
1006			Gas Sampling Room	RIO	1	100		341								A COUNTRY OF THE POST OF THE P
•				DCMIS Workstations	2	920		6280						I&C		1 control console consists of 1 computer and 4 screens. Power supply for computer is 200 w (Dell Model DHP) and 180 w (Dell model 1905 FP) for 1 screen. Total power supply is 920 watts.
1008			Operations Room	CCTV Power supplies	2	960		6553					Source: SuperON Technology Co website (http://www.globalsources.com/gsol/l /CCTV- control/p/sm/1000532009.htm)		•	
				DCMIS Network Cabinet		500		1707				· · · · · · · · · · · · · · · · · · ·				Assumed 500 watts each.
1009			Communication Room	Comm Cabinets	5.	750		12799								Assumed 750 watts each
4044			1124/1/	RIO	1	100		341						·		
1011 1012			LLW Vestibule LLW Staging Room	RIO RIO	1	100 100		341 341	-					4		
1013			Loading Room	RIO	1	100		341								
1015			Cask Unloading Room	RIO	1	100		341								÷
1016			CTM Maintenance Room	RIO	1	100		341								**************************************
1017			Cask Preparation Room	RIO	1	100		341						·		*************************************
1017			Electrical Room (normal	DCMIS I/O Cabinet	1	1000		3413								
1018			Power)	PLC	2	350		2389								
1019			HVAC Room (ITS HEPA	RIO	1	100		341								
			Exhaust Train B)	DCMIS I/O Cabinet	1	1000		3413								
1020			Electrical Room (ITS Train B)	PLC	1	350		1195						······		
1021A			Transportation Cask Vestibule	RIO	1	100		341								
2001		··	Operations/Maintenance Storage Room	RIO	1	100		341								Room 2001 is not identified in Reference 2
2003			HVAC Room North (Process Area Supply)	RIO	1	100		341								100 m 200 m to the incommon in recipience 2
2004			HVAC Room North (Process Area Supply)	RIO	1	100		341								
2005			Instrument & Electrical Storage	RIO	1	100		341								Room 2005 is not identified in Reference 2
2007			Canister Transfer Room	RIO	1	100		341							··	TOO IS NOT HOLD THE PROPERTY OF THE PARTY OF
2009			HVAC Room South	RIO	1	100		341								Labeled as "HVAC Room South (Process Area Supply" in Reference 2.
2010			HVAC Room South (Process Area Supply)	RIO	1	100		341					·			

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Attachment 4 – Print of File, RF Heat Load List (C&I).xls (Continued)

RF Heat Load List

Room No.	Conf. Zoning C or NC	Area	Room Name	Heat Source	Qty.	Heat Load/Eq ulpment (Watts)	Motor Location Type	Total Equip Load (Btu/hr)	Continuous Operation	Intermittent Operation	Simultaneous	Indoor Design Temp	Reference Document	Originating Group/ Discipline	Contact Person	Remarks
2011			HVAC Room South (Process Area Supply)	RIO	1	100		341								Room 2011 is not identified in Reference 2.
NOTE: V	ALUES IN	THIS TABL	E ARE PRELIMINARY AND WI	L BE VERIFIED AS THE	DESI	GN PROG	RESSES.	<u> </u>	[ļ						<u>.</u>
REFERE											<u></u>					
2) 200-Pi 3) 200-3	K-RF00-10 R-RF00-00	1102-000, F 0200-000 li	REV 00A - RECEIPT FACILITY F REV 00A - RECEIPT FACILITY F &C 6-18-07 DOC (INTEGRATEL L SYSTEMSVSORSVRECEIPT F	PRELIMINARY LAYOUT SYSTEM OPERATION	SECO	ND FLOOF	R PLAN) (FILE								

-0056364.xls,7/9/2007

ATTACHMENT 5: HVAC AND MECHANICAL PROCESS EQUIPMENT LIST

(5 pages)

This list contains HVAC and Mechanical Process equipment and their motor drive using drawings with their document number listed in the Remarks/Additional Info column as reference.

Attachment 5 - Enclosure 5

RF HVAC EQUIPMENT SAFETY LOAD **PACKAGED COMPONENT RATING** CLASS LOAD OTHER **OPERATIONAL REMARKS/ADDITIONAL TYPE** EQPT. COMPONENT **STATUS** REQUIREMENTS REQUIREMENTS COMPONENT ID LOCATION (Note 1) INFO. DESCRIPTION (Note (Note 3) (Note 4) (Note 5) NON-2) HP/KVA/KW VOLTAGE PHASE ITS YES NO ITS 2003 HVAC ROOM NORTH V&ID: 200-M80-VCT0-00206-000 Х ASD AIR HANDLING UNIT 125 HP C Calc 200-VCT0-AHU-00001 Note 6 Note 6 (PROCESS AREA SUPPLY) 2003 HVAC ROOM NORTH ASD V&ID: 200-M80-VCT0-00206-000 125 HP Х С Χ 200-VCT0-AHU-00002 AIR HANDLING UNIT Note 6 Note 6 Calc (PROCESS AREA SUPPLY) 2004 HVAC ROOM NORTH ASD V&ID: 200-M80-VCT0-00206-000 200-VCT0-AHU-00003 AIR HANDLING UNIT 125 HP Note 6 Note 6 Х S Х Calc (PROCESS AREA SUPPLY) 2009 HVAC ROOM SOUTH 200-VCT0-AHU-00004 AIR HANDLING UNIT 100 HP Note 6 Note 6 Х С Х Calc ASD V&ID: 200-M80-VCT0-00201-000 (PROCESS AREA SUPPLY) 2010 HVAC ROOM SOUTH 100 HP Х ASD V&ID: 200-M80-VCT0-00201-000 200-VCT0-AHU-00005 AIR HANDLING UNIT Note 6 Note 6 S Х Calc (PROCESS AREA SUPPLY) 2010 HVAC ROOM SOUTH ASD V&ID: 200-M80-VCT0-00103-000 AIR HANDLING UNIT 75 HP Х С Х Calc 200-VCT0-AHU-00006 Note 6 Note 6 (PROCESS AREA SUPPLY) 2011 HVAC ROOM SOUTH AIR HANDLING UNIT 75 HP Х ASD V&ID: 200-M80-VCT0-00103-000 200-VCT0-AHU-00007 Note 6 Note 6 (PROCESS AREA SUPPLY) 2006 HVAC ROOM (HEPA 200-VCT0-EXH-00001 EXHAUST FAN EXHAUST FOR SUPORT, 75 HP Note 6 Note 6 Х C Х Calc ASD V&ID: 200-M80-VCT0-00205-000 **DECON AND LLW AREAS)** 2006 HVAC ROOM (HEPA 200-VCT0-EXH-00002 EXHAUST FAN EXHAUST FOR SUPORT. 75 HP Note 6 Note 6 Х C Х Calc ASD V&ID: 200-M80-VCT0-00205-000 **DECON AND LLW AREAS) EXHAUST FAN (TRAIN** 1004 HVAC ROOM (ITS 200 HP С ASD V&ID: 200-M80-VCT0-00101-000 200-VCT0-EXH-00005 Х Х Calc Note 6 Note 6 HEPA EXHAUST TRAIN A) **EXHAUST FAN (TRAIN** 1019 HVAC ROOM (ITS 200-VCT0-EXH-00006 200 HP Note 6 Note 6 Χ S Х Calc ASD V&ID: 200-M80-VCT0-00102-000 **HEPA EXHAUST TRAIN B)** 1004A HVAC ROOM (ITS **EXHAUST FAN (TRAIN** 200-VCT0-EXH-00009 HEPA EXHAUST FOR 7.5 HP Х Calc ASD V&ID: 200-M80-VCT0-00302-000 Note 6 Note 6 Х BATTERY ROOM TRAIN A) 1004A HVAC ROOM (ITS **EXHAUST FAN (TRAIN** HEPA EXHAUST FOR 200-VCT0-EXH-00010 7.5 HP Note 6 Х Calc ASD V&ID: 200-M80-VCT0-00302-000 Note 6 **BATTERY ROOM TRAIN A)** 1019A HVAC ROOM (ITS **EXHAUST FAN (TRAIN** HEPA EXHAUST FOR ASD V&ID: 200-M80-VCT0-00304-000 200-VCT0-EXH-000011 15 HP Note 6 Note 6 Х С Х Calc **BATTERY ROOM TRAIN B)** 1019A HVAC ROOM (ITS **EXHAUST FAN (TRAIN** 200-VCT0-EXH-00012 HEPA EXHAUST FOR 15 HP Note 6 Note 6 Х S Х Catc ASD V&ID: 200-M80-VCT0-00304-000 **BATTERY ROOM TRAIN B)** 2006 HVAC ROOM (HEPA V&ID: 200-M80-VCT0-00205-000 ASD 200-VCT0-EXH-00013 **EXHAUST FAN** EXHAUST FOR SUPORT, 75 HP Х S Calc Note 6 Note 6 DECON AND LLW AREAS)

RF HVAC EQUIPMENT

COMPONENT ID	COMPONENT	LOCATION	СОМРО	NENT RATIN	lG	CI	FETY LASS ote 1)	LOAD TYPE (Note	PACK EQ		LOAD STATUS	OTHER REQUIREMENTS	OPERATIONAL REQUIREMENTS	REMARKS/ADDITIONAL INFO.
			HP/KVA/KW	VOLTAGE	PHASE	ITS	NON- ITS	2)	YES	NO	(Note 3)	(Note 4)	(Note 5)	
200-VCT0-FLT-00001	HEPA FILTER PLENUM	2006 HVAC ROOM (HEPA EXHAUST FOR SUPORT, DECON AND LLW AREAS)	N/A	N/A	N/A		х	С	_	х	Calc	. N/A		V&ID: 200-M80-VCT0-00205-000
200-VCT0-FLT-00002	HEPA FILTER PLENUM	2006 HVAC ROOM (HEPA EXHAUST FOR SUPORT, DECON AND LLW AREAS)	N/A	N/A	N/A		х	С		x	Calc	N/A		V&ID: 200-M80-VCT0-00205-000
200-VCT0-FLT-00005	EXHAUST HEPA FILTER PLENUM (TRAIN A)	1004 HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	N/A	N/A	N/A	х		С		x	Calc	· N/A	-	V&ID: 200-M80-VCT0-00101-000
200-VCT0-FLT-00006	EXHAUST HEPA FILTER PLENUM (TRAIN A)	1004 HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	N/A	N/A	N/A	х		С		×	Calc	N/A	4	V&ID: 200-M80-VCT0-00101-000
200-VCT0-FLT-00007	EXHAUST HEPA FILTER PLENUM (TRAIN A)	1004 HVAC ROOM (ITS HEPA EXHAUST TRAIN A)	N/A	N/A	N/A	X		С		×	Calc	N/A		V&ID: 200-M80-VCT0-00101-000
200-VCT0-FLT-00008	EXHAUST HEPA FILTER PLENUM (TRAIN B)	1019 HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	N/A	N/A	N/A	X		S		х	Calc	N/A		V&ID: 200-M80-VCT0-00102-000
200-VCT0-FLT-00009	EXHAUST HEPA FILTER PLENUM (TRAIN B)	1019 HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	N/A	N/A	N/A	X		S		х	Calc	N/A		V&ID: 200-M80-VCT0-00102-000
200-VCT0-FLT-00010	EXHAUST HEPA FILTER PLENUM (TRAIN B)	1019 HVAC ROOM (ITS HEPA EXHAUST TRAIN B)	N/A	N/A	N/A	X		S		х	Calc	N/A		V&ID: 200-M80-VCT0-00102-000
200-VCT0-FLT-00013	HEPA FILTER PLENUM	2006 HVAC ROOM (HEPA EXHAUST FOR SUPORT, DECON AND LLW AREAS)	N/A	N/A	N/A		х	S		х	Calc	N/A		V&ID: 200-M80-VCT0-00205-000

Note 1: Safety class applies to electrical requirements only.

Note 2: Load Type: C = Continuous, I = Intermittent, S = Standby

Note 3: Load Status: Prel = Preliminary, Calc = Calculated, or Conf = Confirmed

Note 4: Other Requirements: ASD (Adjustable Speed Drive), 2-Speed Drive, 1-Speed Drive, etc.

Note 5: Operational Requirements: All HVAC equipment must be running for this building to be operational for production.

Note 6: Electrical discipline will specify the component voltage and phase based on provided HP

Attachment 5 – Enclosure 5 (Continued)

RF MECHANICAL SYSTEMS/PROCESS EQUIPMENT (Last updated on 11/12/07)

COMPONENT ID	COMPONENT DESCRIPTION		LOCATION	COMPONENT RATING			SAFETY CLASS (Note 1)		LOAD TYPE (Note	PACKAGED EQPT.		LOAD STATUS	OTHER REQUIREMENTS	1 '	REMARKS/ADDITIONAL INFO
			HP/kVA/kW	VOLTAGE	PHASE	ITS	NON- ITS	2)	YES	NO	(Note 3)	(Note 4)	(Note 5)		
200-PSG0-VSL-00001	GPA RECEIVER	ROOM 2012, 2ND FLOOR	N/A	N/A	N/A		×	N/A		х	PREL				
200-PSA0-VSL-00001	IA RECEIVER	ROOM 2012, 2ND FLOOR	N/A	N/A	N/A		х	N/A		х	PREL				
200-PSG0-SKD-00001	GP DRYER PACKAGE	ROOM 2012, 2ND FLOOR	13.5 kW	Note 6	Note 6		х	ı	×		PREL		Yes	Calculation in Check and P&ID i drafting. NOTE 9	
200-PSA0-SKD-00001	IA DRYER PACKAGE	ROOM 2012, 2ND FLOOR	3 kW	Note 6	Note 6		х	. 1	×		PREL		Yes	Calculation in Check and P&ID in drafting. NOTE 9	
200-PSG0-CMP0-00001-A	AIR COMPRESSOR	OUTSIDE	200 HP	Note 6	Note 6		х	ı	×		PREL		Yes	Calculation in Check and P&ID in drafting. NOTE 9	
200-PSG0-CMP0-00001-B	AIR COMPRESSOR	OUTSIDE	200 HP	Note 6	Note 6		х	l	х		PREL		Yes	Calculation in Check and P&ID in drafting. NOTE 9	
200-PSG0-CMP0-00001-C	AIR COMPRESSOR	OUTSIDE	200 HP	Note 6	Note 6		Х	S	х		PREL		Yes	Calculation in Check and P&ID in drafting. STANDBY	
200-PSE0-VSL-00001	ME SERVICE GAS STORAGE VESSEL (He)	OUTSIDE THE NORTH SUPPORT AREA	N/A	N/A	N/A		х	N/A	х		PREL		,		
200-PSC0-P-00001-A	ME CHILLED WATER PUMP	MAINTENANCE ROOM # 1014									1505 0001	400 DOOD 00404 0004 0			
200-PSC0-P-00001-B	ME CHILLED WATER PUMP	MAINTENANCE ROOM # 1014			This equipn	nent is i	n inspection	and can be	tound on	the issue	ed P&ID: 200-N	//160-PSC0-00101-000 to 2	90-M60-PSC0-00103-000.		
200-PSH0-P-00001-A	HOT WATER PUMP	MAINTENANCE ROOM # 1014													
200-PSH0-P-00001-B	HOT WATER PUMP		This equipment is in inspection and can be found on the issued P&ID: 200-M60-PSH0-00101-000 to 200-M60-PSH0-00103-000.												
		MAINTENANCE ROOM # 1014			rino equipri	nent is i	n inspection	and can be	found on	the issue	ed P&ID: 200-N	160-PSH0-00101-000 to 20	00-M60-PSH0-00103-000.		
200-MRE0-DET-00001	MP CASK CAV GAS SAMPLING UNIT (VENDOR PACKAGE)	MAINTENANCE ROOM # 1014 GROUND FLOOR, ROOM 1006	1kW (Note 7)	Note 6	Note 6	nent is i	n inspection	and can be	e found on	the issue	PREL	/60-PSH0-00101-000 to 20	00-M60-P\$H0-00103-000.		
200-MRE0-DET-00001 200-MRE0-VACP-00001	SAMPLING UNIT (VENDOR		1kW (Note 7)		Note 6		х	I	X		PREL			See Note 7.	
	SAMPLING UNIT (VENDOR PACKAGE) MP CASK CAV GAS	GROUND FLOOR, ROOM 1006	1kW (Note 7)	This	Note 6 equipment is	s in insp	X ection and c	I an be found	X d on the iss	sued P&II	PREL D: 200-M60-M	N/A			
200-MRE0-VACP-00001	SAMPLING UNIT (VENDOR PACKAGE) MP CASK CAV GAS SAMPLING VAC PUMP MP LIQUID LLW SUMP	GROUND FLOOR, ROOM 1006 GROUND FLOOR, ROOM 1006	1kW (Note 7)	This	Note 6 equipment is	s in insp	X ection and c	I an be found	X on the iss	sued P&II	PREL D: 200-M60-M D: 200-M60-M	N/A RE0-00101-000-00A.			
200-MRE0-VACP-00001 200-MWL0-P-00002	SAMPLING UNIT (VENDOR PACKAGE) MP CASK CAV GAS SAMPLING VAC PUMP MP LIQUID LLW SUMP PUMP MP LIQUID LLW SAMPLING	GROUND FLOOR, ROOM 1006 GROUND FLOOR, ROOM 1006 SUMP PIT, ROOM P001	1kW (Note 7)	This	Note 6 equipment is	s in insp	X ection and c	I an be found	X on the iss	sued P&II	PREL D: 200-M60-M D: 200-M60-M	N/A RE0-00101-000-00A. WL0-00107-000-00A.			
200-MRE0-VACP-00001 200-MWL0-P-00002 200-MWL0-P-00001 200-MWL0-TK-00001	SAMPLING UNIT (VENDOR PACKAGE) MP CASK CAV GAS SAMPLING VAC PUMP MP LIQUID LLW SUMP PUMP MP LIQUID LLW SAMPLING PUMP MP LIQUID LLW SAMPLING	GROUND FLOOR, ROOM 1006 GROUND FLOOR, ROOM 1006 SUMP PIT, ROOM P001 SUMP PIT, ROOM P001		This This	Note 6 equipment is equipment is	s in insp	X ection and c ection and c	I an be found	X on the iss	sued P&II	PREL D: 200-M60-M D: 200-M60-M D: 200-M60-M	N/A RE0-00101-000-00A. WL0-00107-000-00A.			
200-MRE0-VACP-00001 200-MWL0-P-00002 200-MWL0-P-00001	SAMPLING UNIT (VENDOR PACKAGE) MP CASK CAV GAS SAMPLING VAC PUMP MP LIQUID LLW SUMP PUMP MP LIQUID LLW SAMPLING PUMP MP LIQUID LLW SAMPLING TANK	GROUND FLOOR, ROOM 1006 GROUND FLOOR, ROOM 1006 SUMP PIT, ROOM P001 SUMP PIT, ROOM P001 SUMP PIT, ROOM P001	N/A	This This N/A	Note 6 equipment is equipment is equipment is	s in insp	X ection and cection and ce	I an be found	X on the iss	sued P&II sued P&II	PREL D: 200-M60-M D: 200-M60-M D: 200-M60-M PREL	N/A RE0-00101-000-00A. WL0-00107-000-00A.			

Note 2: Load Type: C = Continuous, I = Intermittent, S = Standby.

Note 3: Load Status: PREL = Preliminary, Calc = Calculated, or Conf = Confirmed.

Note 4: Other Requirements: VFD (Variable Frequency Drive), 2-Speed Drive, 1-Speed Drive, etc.

Note 5: Operational Requirements: All equipment must be running for this building to be operational for production.

Note 6: Electrical discipline will specify the component voltage and phase based on provided HP.

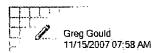
Note 7: Based on engineering estimate. Calculation for the gas sampling will be revised to reflect the power requirements and bases. Typical unit is single phase, 120 VAC.

Note 9: Estimated hours of operation of compressors and dryers are 6 hours per use and a total of 12 hours per day. This requires further confirmation.

ATTACHMENT 6: E-MAIL REGARDING MECHANICAL HANDLING GROUP EQUIPMENT HEAT GAIN INFORMATION

(3 pages)

This e-mail is from Bryan Elliot of the BSC Mechanical Handling Group, dated 11/14/07, to Greg Gould of the BSC Mechanical HVAC Group, and then forwarded to Elpidio S. Castroverde of the BSC Mechanical HVAC Group. It confirms the heat load and use factor of various pieces of equipment used throughout the RF.



To:

Monico Pingul/YM/RWDOE@CRWMS, Elpidio Castroverde/YM/RWDOE@CRWMS, Gin

Cababa/YWRWDOE@CRWMS, Fred Favis/YWRWDOE@CRWMS, Oscar
Rosales/YMRWDOE@CRWMS, Ricardo Abraham/YMRWDOE@CRWMS, Orlando
Santiago/YMRWDOE@CRWMS, Jerry Herszman/YMRWDOE@CRWMS, Hang
Yang/YM/RWDOE@CRWMS, Orlando Asuncion/YMRWDOE@CRWMS

Tracy Johnson/YWRWDOE

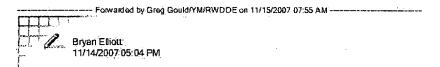
Subject: Fw: Mechanical Handling Equipment Loads

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Gentlemen,

Bryan has taken a final look at the mechanical equipment loads and use factors. He has also addressed the incidental loads (See below). Please use the attached spreadsheet for your calculation. Please look at the information and elevate any problems you find.

Greg



Greg Gould/YWRWDOE@CRWMS
Daryl Lopez/YWRWDOE@CRWMS, Maurice LaFountain/YWRWDOE@CRWMS

Subject: Mechanical Handling Equipment Loads

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Greg,

Attached is an Excel file providing the loads for the mechanical handling equipment.

The loads are based on the motor sizes shown on issued mechanical equipment envelope drawings. This table also provides the updated usage factors, based on the throughput studies.

After some investigation, incidental loads (power for controls) are insignificant, and are thus not included within the table.

Please let me know if you need anything further.

Bryan Elliott



MH Equipment Load List:xls

Equipment Number	Room Number	Room Name	Description	Use Factor	Load Factor	Equipment Motors	Continuous operation	Intermittent operation		Remark 1
200-HM00-CRN-00001	1017	Cask Preparation Room	CASK HANDLING CRANE	0.45	1.00	H 90HP,A 45HP, T 7.5HP & B 30HP		X	200-MJ0-HM00-00101-000	Only one motor operates at a time
200-HMC0-CRN-00001	1002	Lid Bolting Room	LID BOLTING ROOM CRANE	0.35	1.00	H 25HP,T 1.5HP & B 3HP		(200-MJ0-HMC0-00101-000	Only one motor operates at a time
200-HMC0-PLAT-00001	1017	Cask Preparation Room	MOBILE ACCESS PLATFORM	0.45	1.00	(4) 1HP, (4) 5HP, (2) 10HP		x x	000-MJ0-HMC0-00301-000	Use (2) 10 HP motors for load. Equipment can operate at the same time as the Cask Handling Crane
200-HTC0-CRN-00001	2007	Canister Transfer Room	CTM MAINTENANCE CRANE	0.10	0.85	H 35HP,T 2HP & B 7.5HP		(200-MJ0-HTC0-00101-000	Only one motor operates at a time
200-HTC0-FHM-00001	2007	Canister Transfer Room	CANISTER TRANSFER MACHINE	0.20	1.00	45HP, 3HP,(2) 7.5HP,60HP, 5 HP			000-MJ0-HTC0-00201-000	Only one motor operates at a time
200-HTC0-HTCH-00001	2007	Canister Transfer Room	CASK PORT SLIDE GATE	G F Gds		(2) .5 HP			000-MJ0-H000-00301-000	Both motors operate at the same time
200-HTC0-HTCH-00002	2007	Canister Transfer Room	AO PORT SLIDE GATE			(2) .5 HP			000-MJ0-H000-00301-000	Both motors operate at the same time
200-RF00-DR-00001	1017	Cask Preparation Room	CASK UNLOADING ROOM SHIELD DOOR (TYPE 5)			7.5 HP, 7.5 HP			000-MJ0-H000-01101-000	Both motors operate at the same time
200-RF00-DR-00002	1002	Lid Bolting Room	LOADING ROOM SHIELD DOOR (TYPE 2)	9116.00	138.7	7.5 HP, 7.5 HP			000-MJ0-H000-00801-000	Both motors operate at the same
200-RF00-DR-00003	1017A	Cask Preparation Annex	CASK PREPARATION ROOM EQUIPMENT CONFINEMENT DOOR SOUTH		- 1	(2) 3HP			200-MJ0-HMH0-00301-000	Both motors operate at the same time

Attachment 6 168 December 2007

ATTACHMENT 7: E-MAIL REGARDING THE NUMBER OF OCCUPANTS IN THE RF BUILDING.

(3 pages)

This attachment contains e-mails from Clarence Smith to Ricardo Abraham and Clayton De Losier, dated 06/12/2007 and 07/09/2007, confirming the number and distribution of occupants in the RF building.



Ricardo Abraham 07/03/2007 04:19 PM

To:

Clayton De Losier/YM/RWDOE@CRWMS

Subject: Fw. Number of Personnel in the RF Facility

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

------ Forwarded by Ricardo Abraham/YM/RWDOE on 07/03/2007 04:19 PM -----------



Clarence Smith

06/12/2007 07:23 AM

To:

Ricardo Abraham/YM/RWDOE@CRWMS Clarence SmithYM/RWD0E@CRWMS Subject: Re: Number of Personnel in the RF Facility 19

LSN Not Relevant - Privileged User Filed as: Excl/AdminMgmt-14-4/QAN/A

Ricardo the staffing for the RF will be approximately 20 people per shift for a 24/7 operation this will include Rad protection, QC, Operation, maintenance and supervisors. If you have any questions please give me a call Thanks Clarence

Ricardo Abraham



Ricardo Abraham 06/11/2007 04:32 PM

To:

Clarence Smith/YM/RWDOE@CRWMS
Tracy Johnson/YM/RWDOE@CRWMS, Oscar Rosales/YM/RWDOE@CRWMS

Subject: Number of Personnel in the RF Facility

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

I'm doing the HVAC cooling load calculation for the RF facility. I need the number of personnel that will be working in this Facility to be included in my cooling and heating load calculation. Please provide the number of Personnel on each area in the the RF facility.

Thanks, Ricardo.



Clarence Smith '07/09/2007 11:32 AM

cc:

Clayton De Losier/YM/RWDOE@CRWMS Clarence Smith/YM/RWDOE@CRWMS

Subject: Re: RF Personnel 115

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA/N/A

I concur the data listed below is per our conversation as to the location of personnel within the RF facility.

Thanks Clarence

Clayton De Losier



Clayton De Losier 07/09/2007 09:57 AM

To:

Clarence SmithYM/RWDOE@CRWMS

Subject:: RF Personnel

LSN: Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QAN/A

Dear Clarence Smith,

I need to have documentation of our earlier conversation for my document, therefore, can you please reply to this e-mail and state that the following personnel distribution for the RF is correct, per our earlier discussion.

Room No.	Room Name	No. of People:
1001	Site Transporter Vestibule	1.
1002	Lid Bolt Room	4.
1017 and 1017A	Cask Preparation Room and	8
	Annex	
1207	Operations Room	2
1209	Staff Work Room	2
1223	Gas Sampling Room	1
1224	Instrument Room	2

Thank You,

Clayton De Losier

ATTACHMENT 8: SECOND E-MAIL REGARDING MECHANICAL HANDLING GROUP EQUIPMENT HEAT GAIN INFORMATION

(3 pages)

This e-mail is from Scott Drummond of the BSC Mechanical Handling Group, dated 7/13/07, to Clayton De Losier of the BSC Mechanical HVAC Group. It confirms the heat loads of pieces of equipment that were left off in the first e-mail.

Scott Drummond

07/13/2007 07:59 AM

To: Clayton De Losier/YM/RWDOE@CRWMS
cc: Lisa Green/YM/RWDOE@CRWMS
Subject: Fw. RF Mechanical Handling Equipment

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QAN/A

Clayton

Per our conversation:

The information on the attache sheets is correct: the site transporter that enters the CRCF is the same that enters RF.

The platform motor size is correct, you could reference the MEE for both.

Scott

------ Forwarded by Scott Drummond/YM/RV/DOE on 07/13/2007 08:00 AM ------



Lisa Green 07/13/2007 07:06 AM

To:

Scott DrummondYM/RWDOE@CRWMS Clayton De Losier/YM/RWDOE@CRWMS

Subject: Fw. RF Mechanical Handling Equipment

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Scott,

Please verify and get back to Clayton.

Thanks 0)

Lisa

------ Forwarded by Lisa Green/YM/RWDOE on 07/13/2007 07:08 AM -----------------



07/12/2007 03:46 PM

To:

Lisa:Green/YM/RWDOE@CRWMS

Subject:: RF Mechanical Handling Equipment

Clayton De Losier

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Dear Lisa Green;

I am working on a calculation and I need to verify some information. Can you please review the attached file and let me know if this information is correct.

Thank You,

Clayton De Losier

RF Equipment.xls

Attachment 8 - Print of File, RF Equipment.xls

Room No.	Room Name	Heat Source Note 1	Qty. Note 2	Heat Load, Each Note 5	Units Note 6	Continuous Operation Note 9	Intermittent Operation Note 10	Simultaneous Operation (Intermittent) Note 11	Originating Group/ Discipline
1002	LID Bolting Room	SITE TRANSPORTER	1	75.0	HP			×	Mechanical Handling
1002	LID Bolting Room	CASK PREPARATION PLATFORM	1	5.0	HP		×		Mechanical Handling
1013	Loading Room	SITE TRANSPORTER	1	75.0	HP			×	Mechanical Handling

ATTACHMENT 9: E-MAIL REGARDING MECHANICAL HANDLING EQUIPMENT HEAT GAIN DIVERSITY FACTOR

(3 pages)

This e-mail is from Steve Ployhar of BSC Mechanical Handling Group, dated 11/17/07, to Greg Gould of BSC Mechanical HVAC Group and forwarded to Elpidio S. Castroverde of BSC Mechanical HVAC Group stating that a factor of 4 reduction in heat load from operation of Mechanical Handling equipment motors, from what is assumed based on the throughput use factors, is justified and still conservative.



Greg Gould 11/17/2007 08:38 AM

Fred Favis/YM/RWDOE@CRWMS, Monico Pingul/YM/RWDOE@CRWMS, Elpidio Castroverde/YM/RWDOE@CRWMS, Ricardo Abraham/YM/RWDOE@CRWMS, Orlando To:

Santiago/YWRWDOE@CRWMS

Gin Cababa/YWRWDOE@CRWMS, Oscar Rosales/YWRWDOE@CRWMS, Jerry cc:

Herszman/YM/RWDOE@CRWMS, Orlando Asuncion/YM/RWDOE@CRWMS, Tracy Johnson/YM/RWDOE, Hadi Jalalin/WRWDOE@CRWMS, Debra Nevergold/YWRWDOE@CRWMS,

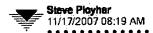
David Tooker/YM/RWDOE@CRWMS

Subject: Fw: MH Equipment Heat Loads

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Please use where applicable in your calculations. Coordinate with Fred Favis as to a consistent approach.

--- Forwarded by Greg Gould/YM/RWDDE on 11/17/2007 08:32 AM --



To: Greg Gould/YM/RWDOE@CRWMS

Bryan Elliot/YMRWDOE@CRWMS, Tracy Johnson/YWRWDOE@CRWMS

Subject: MH Equipment Heat Loads

LSN: Not Relevant - Not Privileged User Filed as: Excl/AdminMgmt-14-4/QA:N/A

Greg,

I believe that a factor of 4 reduction in heat load from operation of MH equipment motors, from what is assumed based on throughput use factors, is justified and still conservative. See attachment.

Steve



MH Equipment Heat Loads for HVAC Load Calcs_17Nov07.doc

Mechanical Handling Equipment Heat Loads for Use in HVAC Load Calculations

HVAC engineers are assuming that mechanical handling equipment motors operate continuously based on the use factors defined in the YMP throughput analyses. This assumption is conservative. While the equipment may be "occupied," meaning it is dedicated to a task for those periods, it is not in continuous operation (producing heat) during all of that time. Two examples from WHF evaluated below.

Canister Transfer Machine

Use Factor (WHF) = 0.20

Time CTM in use each 24 hours:

288 minutes

On a busy day, the WHF CTM might handle the import of a DPC (from an AO to an STC) and the export of a loaded TAD (from an STC to an AO). This involves two canister lifts and 8 lid lifts (conservatively assume remove and replace at each end of the transfer). The total vertical travel of the CTM hoist for all these lifts (up and down) is on the order of 200 feet. At 5 feet per minute hoist speed, the hoist will be operating (producing heat) for 40 minutes.

Other, smaller CTM motors will be in use for horizontal travel from port to port and back and forth to the lid staging location. A total of 500 feet of travel is estimated. At 20 feet per minute this is another 25 minutes of motor operation.

Based on this conservative evaluation, the large CTM motors are producing heat only about 23% of the time that the CTM is occupied based on the use factor.

Site Transporter Vestibule Shield Door

Use Factor (WHF) = 0.10

Time Shield Door in use each 24 hours:

144 minutes

On a busy day it could be assumed that this shield door might be opened 4 times to allow a site transporter to enter or depart. This door has a travel of $20^{\circ} - 6^{\circ}$. Total travel distance is thus 164 feet. Assuming a slow travel speed of 5 fpm (actual speed not known) result in a motor operating time of 32.8 minutes

Based on this conservative evaluation, the large shield door drive motor is producing heat only about 23% of the time that the shield door is occupied based on the use factor.

Conclusion:

These two examples produced a similar result by chance, but I believe these results are typical for cranes and other mechanical handling equipment. Where HVAC load calculations assume continuous motor heat generation based on the throughput study use factors, I believe these heat loads could be reduced by a factor of four and still be conservative.

Steve Ployhar/ November 17, 2007

MH Equipment Heat Loads for HVAC Load Calcs_17Nov07.doc

Page 1 of 1

BSC

Calculation/Analysis Change Notice

1. QA: N/A 2. Page 1 of <u>1</u>

Complete only applicable items.

3. Document Identifier:			4. Rev.:	5. CACN:
200-M8C-VCT0-00400-000	00C	001		
6. Title:	N. ITTO			
RF Heating and Cooling Load Calculation (Tertiary	Non 115)			
7. Reason for Change:		D	1 . 6	
In Table 5 Space Airflow Rates, there is an administ "Corridor Total" under "Use Airflow cfm" and "Ad				
on Rooms 1003E, 1003F, 1003G, 2002E, 2002F, 20				
This is documented in CR 11593			turn And Exi	aust Ali .
This change does not impact the results of this calcu		,		
Time onunge does not impute the results of time care.				
•				
				•
8. Supersedes Change Notice:	s, CACN No.:			☑ No
9. Change Impact:				
Inputs Changed: Yes No		Results Impacted:	Yes	
		-		
Assumptions Changed: Yes No		Design Impacted:	∐ Yes 🖸	☑ No
10. Description of Change:	2012	4/TT A' CI C 12 1 4	رة بروم الم	
(1) On Page 36, Table 5 Space Airflow Rates, Room	1 2012 under	"Use Airflow cfm" change	5.420" to "5,420".	
(2) On Page 36, Table 5 Space Airflow Rates, Corri	dor Total und	der "Use Airflow ofm" chanc	re "5 000" to "5 08	
(2) On Fage 50, Table 5 Space Almow Rates, Com-	uoi Totai uit	iei Ose Anthow Chin Chang	ge 3,000 to 3,08	<i>,</i>
(3) On Page 36, Table 5 Space Airflow Rates, Corri	dor Total und	der "Adjusted Room Sensible	e Load" change "15	5.223" to
"157,689".		•	3	,
(4) On Page 37, Table 5 Space Airflow Rates, Sub s	ystem Totals	under "Adjusted Room Sen	sible Load Btu/h" o	hange "1,094,970" to
"1,086,936".				
(5) On Page 36, Table 5 Space Airflow Rates, Roon	s 1003E 10	03E 1003C 1003H 2002E	2002E 2002G 20	12E 2002E and
2003G under "Exhaust Air" add "0" (zero) above N			2002F, 2002G, 200	75E, 2005F, and
20030 under Exhaust Mi add 0 (2010) above IV	ote 10 m cae.	ii ceii.		
(6) On Page 36, Table 5 Space Airflow Rates, Roon	ns 1003E, 10	03F, 1003G, 1003H, 2002E,	2002F, 2002G, 20	3E, 2003F, and
2003G under "Exhaust Air" add actual values above				
Rooms 1003E=280, 1003F=1020, 1003G=1410, 100	03H=440, 20	02E=1160, 2002F=1120, 20	02G=140, and 200	BE through
2003G=2860.				
	DEVUENDO	AND ADDDOVAL		
11. Printed Name	REVIEWS	AND APPROVAL		D-1-
11a. Originator:	<u> </u>	Signature		Date
Elpidio S. Castroverde		Kandr		12/20/07
11b. Checker:	+		/	7,32,10
Greg W. Gould	1			2/20/07
11c. EGS:		rugus for a		420101
Tracy L. Johnson	1 \ \	(6)		7120107
11d. DEM:		- ANIMOUND		7 10010 /
Hadi Jalali / O.T. ASUNCION	1 (5	1 Vota		12/20/07
11e. Design Authority:	 			
Barbara Rusinko	K	Rusilo	i i	127/07
			i '	

BSC

Calculation/Analysis Change Notice

1. QA: N/A 2. Page 1 of 1
2 Page 1 of 1

Complete only applicable items. ENG.20080116.0001

3. Document Identifier:			4. Rev.:	5. CACN:						
200-M8C-VCT0-00400-000	CACN002									
200-M8C-VCT0-00400-000 00C CACN002 6. Title:										
RF Heating and Cooling Load	Calculation (Tertiary)	Non ITS)								
7. Reason for Change:										
"Corridor Total" under "Use A on Rooms 1003E, 1003F, 100	In Table 5 Space Airflow Rates, there is an administrative error in Room 2012 (period instead of comma) and a typing error in "Corridor Total" under "Use Airflow cfm" and "Adjusted Room Sensible Load Btu/h". Actual values will be added above Note 18 on Rooms 1003E, 1003F, 1003G, 2002E, 2002F, 2002G, 2003E, 2003F, & 2003G under "Return Air" and "Exhaust Air".									
This is documented in CR1159	93.									
This change does not impact the results of this calculation.										
		•								
	·									
8. Supersedes Change Notice:	Yes if, Yes	, CACN No.: CACN001		□No						
9. Change Impact:										
Inputs Changed:	Yes No	Results Impacted:	Yes	⊠ No						
										
Assumptions Changed:	Yes No	Design Impacted:	∐ Yes	No No						
10. Description of Change:(1) On Page 36, Table 5 Space	e Airflow Rates, Room	2012 under "Use Airflow cfm" change	"5.420" to "5,42	20".						
(2) On Page 36, Table 5 Space	e Airflow Rates, Corrid	or Total under "Use Airflow cfm" chang	ge "5,000" to "5	,080".						
(3) On Page 36, Table 5 Space "157,689".	e Airflow Rates, Corrido	or Total under "Adjusted Room Sensibl	e Load" change	"155,223" to						
(4) On Page 37, Table 5 Space "1,086,936".	e Airflow Rates, Sub sy	stem Totals under "Adjusted Room Sen	sible Load Btu/l	n" change "1,094,970" to						
(5) On Page 36, Table 5 Space Airflow Rates, Rooms 1003E, 1003F, 1003G, 1003H, 2002E, 2002F, 2002G, 2003E, 2003F, and 2003G under "Return Air" add actual values above "Note 18" in each cell as follows: Rooms 1003E=280, 1003F=1020, 1003G=1410, 1003H=440, 2002E=1160, 2002F=1120, 2002G=140, and 2003E through										
2003G=2860.										
(6) On Page 36, Table 5 Space Airflow Rates, Rooms 1003E, 1003F, 1003G, 1003H, 2002E, 2002F, 2002G, 2003E, 2003F, and 2003G under "Exhaust Air" add "0" (zero) above "Note 18" in each cell.										
11.		REVIEWS AND APPROVAL								
Printed Nar		Signature		Date						
11a. Originator:		AA.		1-1						
Elpidio S. Castroverde		L. Janes	_	1/9/08						
11b. Checker:				1-1-4						
Greg W. Gould		High Hould		1/9/08						
11c. EGS:		(10/1)		101 -						
Tracy L. Johnson		- / GUMNOON		119108						
11d. DEM:		Valata. Pull								
Hadi Jalali	*			1/15/08						
11e. Design Authority:		100 -11.		1100						
Barbara Rusinko	Barbara Rusinko Demonto 1115/08									